Title

Prevalence of Job Stress, General Health Profile and Hypertension among Professionals in the Information Technology Sector in Bengaluru, India

Author

Rathnaiah Babu, Giridhara

Publication Date

2012

Peer reviewed|Thesis/dissertation

UNIVERSITY OF CALIFORNIA
Los Angeles

Prevalence of Job Stress, General Health Profile and Hypertension among Professionals in the Information Technology Sector in Bengaluru, India

A dissertation submitted in partial satisfaction of the
requirements for the degree Doctor of Philosophy
in Epidemiology

by

Giridhara Rathnaiah Babu

2012

ABSTRACT OF THE DISSERTATION

Prevalence of Job Stress, General Health Profile and Hypertension among Professionals in the Information Technology Sector in Bengaluru, India

by

Giridhara Rathnaiah Babu

Doctor of Philosophy in Epidemiology

University of California, Los Angeles, 2012

Professor Roger Detels, Chair

We, systematically reviewed studies on hypertension among working populations and synthesized the evidence and performed a meta-analysis to answer the question – Is job stress associated with hypertension. The meta-analysis and meta-regression were performed using STATA version 10. Pooled odds ratios were combined together for over all estimates. The Initial search identified 1020, out of which only 17 studies had sufficient information to allow meta-analysis for pooled estimates. The pooled odds ratios infer that job stress is associated with Hypertension, although not statistically significant for cross-sectional and cohort studies.

We conducted both qualitative and a cross sectional studies among professionals working in the I.T and ITES sector in India. The qualitative study included 32 in-depth interviews exploring several risk factors and the health status of the professionals. The results from qualitative study indicate the presence of nine stress domains; job control, autonomy, time pressure, length of experience in industry, night shifts, income, appreciation of work, physical environment, work-environment and emotional factors.

In the cross sectional study, 1071 volunteers completed self-administered questionnaires containing details about job stress (contextual stress domains), musculoskeletal symptoms (Nordic musculoskeletal questionnaire), quality of life (WHOQOL BREF) and sexual behaviors. Further, we took anthropometric measurements and blood pressure. Our study estimated the prevalence of Job stress and its association with Hypertension, quality of life, musculoskeletal symptoms and sexual behaviors.

Our results indicate that 31% of the participants were hypertensive with 5% having stage 2-hypertension. Adjusted regression estimates indicate that subjects with autonomy related stress and higher work environment related stresses were found to have higher odds of having Hypertension. The proportion of IT/ITES workers who had irregular sexual partners was 8% (out of 884) and multiple partners was 5% (out of 914). Among the 964 workers who answered the question, only 4% reported having paid sex in the last 3 months. Among 619 participants who responded to the condom usage question, 74.3% reported not using a condom during their last vaginal intercourse with their wife/husband/regular partner. All the domains (physical, psychological, social and environmental) of quality of life showed statistically significant positive associations with increasing stress domains of autonomy, physical infrastructure, work environment and emotional factors.

Understanding the prevalence's of job stress and other risk factors within this specialized workforce and its association with health parameters can help to prevent morbidity related complications. Identification of risk profiles in this workforce can guide worksite interventions to prevent debilitating conditions thereby improving the health and productivity of the workforce.

The dissertation of Giridhara Rathnaiah Babu is approved.

John Clemens

Snehendu B Kar

Onyebuchi Arah

Roger Detels, Committee chair

University of California, Los Angeles

2012

Dedicated to

Sangeetha and Spoorthi

TABLE OF CONTENTS

LIST OF TABLES

Chapter.1:

Chapter.2: Methods.

Chapter.3:

Chapter.4:

Chapter.5:

Chapter.6: Determinants of sexual behaviour and their association with occupational stress among IT/ITES professionals of Bengaluru, India.

LIST OF FIGURES

ACKNOWLEDGMENTS

I bow to Lord Srikrishna for all the blessings he has accorded to me in life, among the foremost of which is enabling me to be a student of Dr. Roger Detels. Dr. Detels can best be described as a Sat-guru (self-realized master) who selflessly strives to enable his students to attain their full potential and knowledge. I thank Dr. Detels wholeheartedly for all his generosity, kindness and constant advice, and for giving me the independence to develop my own individuality and self-sufficiency. I sincerely thank Prof. Snehendu B. Kar, Dr. O.A. Arah and Dr. John Clemens for agreeing to be on my doctoral committee and providing useful inputs.

Sangeetha, my wife, inspired me to pursue doctoral studies. Her support, encouragement and patience in putting up with my hard work have enriched eleven years of my life.

Spoorthi has been more than a best daughter in bringing a whole world of happiness and energy. As her name means inspiration, so she is, and so will remain.

The professors at UCLA impart rigorous training in epidemiology so that they can produce epidemiologists of a similar quality. Among them, my sincere thanks to Dr. Jørn Olsen, Dr. Sander Greenland, Dr. Beate Ritz and Dr. Onyebuchi A. Arah, for their extraordinary expertise and student-friendly approach of teaching even the most difficult concepts.

A world of thanks to my brothers, Dr.Mohan Babu and Mr. Jayant Babu, and my sister Jahnavi, who have remained best friends. Nothing would have been possible if my father Revoor Rathnaiah and my mother Mrs. Chandramma VT had not endured innumerable sacrifices in bringing up four children in modest circumstances. I thank Santosh Kumar, A. Krishnappa and T. Cheluvamba for having supported me in the pursuit of my career goals whenever the need arose. I sincerely thank Dr. Vivek V. Singh for making that phone call from Atlanta, which was crucial to my decision to enter the PhD program. I thank Mr. Nagendra Bhat from Surathkal who provided spiritual help whenever needed. I cannot by name thank all the very many friends and colleagues who have provided constant help, but can only mention the names of a few who stand out, among them Dr. Jotheeswaran A. Thiagarajan, Dr.Tarun Bhatnagar, Dr.Sathyanarayana T.N. and many others.

I thank Dr. Srinath K. Reddy, Prof. GVS Murthy, Mrs.Kalpana Swamy, Ms.Palkie Barua and others at the Public Health Foundation of India (PHFI) for the institutional support offered for carrying out the research work. I thank Shanth Kumar, for his dedicated support in the field activity and data management. I thank Gayathri Krishna and Madhavi Sunil for their support with administrative

matters. I thank Wendy Aft for all the help throughout. I thank Prof. Roshan Bastani for the collaboration with PHFI and thereby the opportunity to study at UCLA. I thank Ritesh Mistry, Assistant Professor at Michigan, who always stood there as a friend and guide and offered advice and support.

Primary data collection is an arduous process and could not have been done without the help of over a thousand IT/ITES professionals who volunteered for the study. I thank them for their generosity in contributing to every bit of data that led to this dissertation. I thank the HR divisions of IT/ITES companies who have been immensely helpful in providing the permission to conduct the study. My special thanks to Coffee Bean and Tea Leaf ™ for providing space to work and coffee for thought.

It is not often that you see a couple as talented, kind and in addition, extraordinary friends, as Dr. Tanmay Mahapatra and Dr. Sanchita Mahapatra, who went the extra mile to help with valuable feedback. Sanjay Kumar, Santhosh Ghodke and Meka Srinivasa Rao were there as friends at all times in the hours of need. Carlos Brown, Weiming Tang, Erin Peckham, Caroline Thompson and Aritra Das have been immensely instrumental in helping and supporting during the final days of dissertation defense. Thanks to Laura Jean Nasuti and Amara Schrader for being good friends and for being there all the time.

VITA

1999	Bachelor of Medicine and Bachelor of Surgery (MBBS) Kasturba Medical College, Manipal, India.
2000	Junior Resident, Center for Community Medicine & Blood Bank, All India Institute of Medical Sciences, New Delhi
2001-2002	Surveillance Medical Officer, National Polio Surveillance Project, World Health Organization
2002-2006	State Surveillance Medical Officer and (i/c) Regional Coordinator, National Polio Surveillance Project, World Health Organization
2003	Post Graduate Diploma in Medical Law & Ethics (PGMLE) National Law School of India University, Bangalore
2005	Masters in Business Administration-Hospital Administration Adam Smith University with EMDBA from TASMAC, Pune
2007-2008	Research Associate, Multicenter AIDS Cohort Study (MACS), UCLA AIDS Institute with Dr. Roger Detels, UCLA School of Public Health, USA
2008	Masters in Public Health Epidemiology (MPH) School of Public Health, University of California (UCLA), Los Angeles
2008-2009	Teaching Assistant, Department of Epidemiology, UCLA School of Public Health, USA
2008-2009	Special Academic Reader, Department of Epidemiology, UCLA School of Public Health, USA
2010-08' 2010	Senior Lecturer, Department of Epidemiology and Biostatistics, Indian Institute of Public Health-Hyderabad, Public Health Foundation of India
08' 2010-Present	Assistant Professor, Department of Epidemiology and Biostatistics, Indian Institute of Public Health-Hyderabad, Public Health Foundation of India

PUBLICATIONS

Babu GR, Evidence for Health Policy in India: Do we have enough data?. Journal of the Royal Society of Medicine. [In press]

Babu GR, Laxminarayan R. The unsurprising story of MDR-TB resistance in India. Tuberculosis. 2012;92(4):301-6.

Babu GR. Do you see an elephant or just its trunk? The need of learning Modern Epidemiologic Methods: An introduction. The Internet Journal of Epidemiology. 2012;10(2).

Babu GR, Singh VV, Nandy S, Jana S, TN S, Sadhana M. Supportive Supervision And Immunization Coverage: Evidence From India. The Internet Journal of Epidemiology. 2011;9(2).

Babu GR, Samari G, Cohen SP, Mahapatra T, Wahbe RM, Mermash S, et al. Breast cancer screening among females in Iran and recommendations for improved practice: a review. Asian Pacific journal of cancer prevention: APJCP. 2011;12(7):1647.

Babu GR, Olsen J, Jana S, Nandy S, Farid MN, SM S, et al. Evaluation of Immunization Services in high-risk district in India. International Journal of Medicine and Public Health. 2011;1(3):17-21.

Babu GR, Murthy G. “To Use or Not to Use”-Dilemma of Developing Countries in Introducing New Vaccines. Journal of Global Infectious Diseases. 2011;3(4):406.

Babu GR. " Opportunities for improving public health system in India" analysis of current state of affairs and pointers for future. Annals of Tropical Medicine and Public Health. 2011;4(2):69.

Babu GR. Obesity in Elderly and Life Expectancy in India. International Journal of Medicine and Public health. 2011;1(2):2-3.

Babu GR. In Response to. The American Journal of Forensic Medicine and Pathology. 2011;32(2):e15.

Babu GR, Olsen J, Jana S, Nandy S, Farid M, Sadhana. Evaluation Of Immunization Cards And Parental Recall Against Gold Standard For Evaluating Immunization Coverage. The Internet Journal of Epidemiology. 2011;9(2).

Babu GR, Detels R. Prioritizing Social Actions And Involving Community For Prevention Of The Non-Communicable Diseases. The Internet Journal of Epidemiology. 2011;9(2).

Babu GR. India's tryst with creation of public health cadre. Annals of Tropical Medicine and Public Health. 2011;4(2):143.

Babu GR, Sharma P. Problems related to menstruation amongst adolescent girls. Indian journal of pediatrics. 2010;77(2):218-9.

Babu GR, Bhatnagar T. Influenza Vaccination To Elderly: Quantifying The Potential Role Of Unmeasured Confounders Through An Example. The Internet Journal of Epidemiology. 2010;9(1).

Babu GR. Response to 'Cancer incidence rates among South Asians in four geographic regions: India, Singapore, UK and US'. International Journal of Epidemiology. 2009;38(4):1157-8.

Babu GR. Comment on "Development and Validation of a Colon Cancer Risk Assessment Tool for Patients Undergoing Colonoscopy". The American journal of gastroenterology. 2009;104(12):3102-3.

Babu GR. Comment on 'From risk factors to explanation in public health'. Journal of Public Health. 2008.

Ghosh P, Arah O, Talukdar A, Sur D, Babu GR, Sengupta P, et al. Factors associated with HIV infection among Indian women. International journal of STD & AIDS. 2011;22(3):140-5.

Sathyanarayan T, Babu GR. Creating a public health cadre in India: The development of a framework for interprofessional and inter-sector collaboration. Journal of Interprofessional Care. 2011;25(4):308.

Sathyanarayana T. N., Giridhara R. Babu, Shridhar Kadam. Barriers, Challenges and Possible Solutions in Establishing Diabetes Self Management Education (DSME) in India: A Policy Perspective. International Journal of User-Driven Healthcare, 2(3), 1-9, July-September 2012

Sathyanarayana T, Babu GR. Targeted sexual exploitation of children and women in India: Policy perspectives on Devadasi system. Ann Trop Med Public Health. 2012 Jul 17 2012 5(3):157-62

Chapter.1. Job stress and hypertension: A systematic review and meta-analysis of observational studies.

I. Background.

Cardiovascular diseases are a major cause of mortality and disease in the Indian subcontinent, causing more than 25% of deaths.(1) It has been predicted that these diseases will increase rapidly in India and this country will be the locale of more than half the cases of heart disease in the world within the next 15 years. (4) Studies done in India have shown that tobacco use, obesity (high waist: hip ratio), high blood pressure, low consumption of fruits and vegetables and sedentary lifestyles are important determinants of cardiovascular diseases in India. (1-3)4) High blood pressure (Hypertension) is one of the most important risk factor for cardiovascular diseases and a systematic review of studies of the prevalence of hypertension in India has shown a high prevalence in both urban and rural areas.(4) Indian urban population-based studies using WHO guidelines for diagnosis have shown increasing hypertension among adults aged 20 years from about 5% in the 1960–70s to 11–15% in the late 1990s. (2, 3)

In southern India, the prevalence of hypertension was found to be higher in urban areas. (5) There is a strong correlation between urbanization and increase in the risk of non-communicable diseases such as cardiovascular disease in Indian subjects. (6, 7) There is also evidence of a gradient in prevalence from rural to semi-urban to urban populations.(8-10) The disease occurs at younger age in Indian subjects compared to western developed nations. Studies have reported that Coronary risk factors are more prevalent in Indian urban subjects compared to rural populations. (1, 7, 11, 12) Participants from the urban areas were most likely to be in the sedentary and light physical activity categories. (3, 13) These studies observed increased prevalence of Coronary risk factors among the urban population.

The risk factors for poor health among working populations can be genetic, behavioral or biologic. Among these, modifiable factors including high blood pressure, hyperlipidemia, smoking, obesity, sedentary lifestyle and diabetes account for the majority of non-communicable diseases (e.g., 80 percent of clinical cardiovascular disease) in every region of the world.(1, 14) The World Health Report 1999 estimates that in 1998, 78% of the burden of Non Communicable Diseases (NCD) and 85% of the Cardio Vascular Disease (CVD) burden occur in low and middle income countries. Among the non-communicable diseases, cardiovascular disorders together contributed to 59% of global mortality amounting to 31.7 million deaths and 43% of the global burden of disease in 1998.(15, 16) Lifestyle determinants such as diet, physical activity, and tobacco consumption cause an array of non-communicable diseases including cardiovascular diseases (CVD), cancers, diabetes, and chronic obstructive pulmonary disease. These four disorders together contribute to about 50% of global mortality. (15, 16)

It is established that any modest reductions in the risk factors such as smoking, obesity, and hypertension are associated with dramatic reductions in development of non-communicable diseases. However, we are yet to establish the socio-economic and environmental factors at the macro level, which promote these risk factors. (17-19) In nearly all developing countries, cigarette smoking is increasing. (19) In China, high blood pressure was found in 7.7 percent of people age fifteen and older in 1979–80, 50 percent higher than in 1958–59. In India, the prevalence of hypertension increased from 1–3 percent in 1950 to 10–30 percent in 2000.(11)

The increasing burden of morbidity in the developing countries is attributable to the increasing incidence of non-communicable diseases, perhaps related to urbanization. Further, some non-communicable diseases (NCD) manifest at a relatively early age affecting a large proportion of the population especially young adults or the middle-aged in these countries. Establishing a good health profile of the professional workforce is an important investment for the economic

future of developing countries. It is estimated that only 8% of the published research on non-communicable diseases originates from developing countries despite contributing 80% of the disease burden.(19) Most of the developing countries are undergoing epidemiological transitions. The developing countries are witnessing increased rates of chronic diseases and cancer coupled with a continuing high burden of infectious diseases. It is estimated that a smaller proportion of the healthy workforce will have to bear responsibility for a increasingly sick aging population.(20) Hence public health researchers in low and middle-income countries need to recognize the window of opportunity to address factors that can reduce disease burden among workers such as cardiovascular risk to sustain their economies.(19-21)

Workers in the Information Technology (I.T) industry are prone to almost all the recognized risk factors for NCD's. The health profile of Information Technology (I.T) and Information Technology Enabled Service (ITES) professionals is significantly changing as a result of urbanization and other factors. I.T / ITES professionals start working at age 25-30. This age group has increased prevalence of coronary risk factors as established by studies done in India and elsewhere.(7, 11, 22, 23) I.T / ITES professionals may have to sit for long hours (sometimes including day and night completing the project), cannot get regular sleep as they have to work in odd hours, do not have sufficient time and resources to do exercises. The sudden increase in wealth among I.T / ITES professionals puts this group at higher vulnerability to develop habits like smoking, taking drugs and consuming alcohol due to stress or peer pressure. [24] Most of the professionals do time bound work and cannot be involved actively in family activities and, thus may not get adequate social support and respect.(25) It is also reported that, "The biological paradigm by which social factors, such as work stress, are perceived and processed by the central nervous system, result in pathophysiological changes that increase risk of diseases" (24, 26, 27)

It is reported that there is higher prevalence of smoking, excessive drinking, use of drugs and high consumption of unhealthy foods at workplace and outside among professionals in the Information Technology (I.T).(28) Companies engaged in Information Technology (I.T) and Information Technology Enabled Services (I.T.E.S) bill clients on the basis of man- days, man-hours compelling them to adhere to strict timelines. The profitability for IT/ITES companies is based on how well they balance the demand of maximum inputs in terms of time and effort and the costs involved in budgeting process. The Indian I.T/I.T.E.S industry is known for very long working hours often exceeding 8-10 hours per day. It is reported that one of the major reason such overwork pattern is that the man-hours and days that are optimally required for a project are often underestimated in submission of bids in order to keep the cost estimate down. An other reason is also the time difference between India and the client site causing client-provider interaction to take place late in the evening or at night for the Indian members while it is morning in the USA.(29)

Among the computer operators, risk factors associated with musculoskeletal disorders include repetitive motions involving fingers and wrist, static position of neck, visual fixation on computer screens, static position of sitting and other conditions related to the work station and work environment. In a study done in India,(30) eighty six percent of data processing workers reported musculoskeletal pain and discomfort. The study determined that neck, lower and upper back, wrists/hands, shoulders and left elbow pain/discomfort were the major musculoskeletal symptoms in this population. Also, eighty one percent of data- processing staff attributed their pain and discomfort at work to poor seating (49%), constant keying (24%), sitting in the same position for hours (23%) and an awkward computer set up (12%).

It can thus be expected that there will be a higher prevalence of job stress and other cardiovascular risk factors among IT/ITES professionals indicating a need to study such workers

and suggest interventions. The review of the literature suggests that there is an association between job related factors such as stress and strain at work with poor general health, musculoskeletal diseases and cardiovascular dysfunction.(17, 31, 32) Causal mechanisms are not well defined but it is hypothesized that contributing causal factors can include disruption of circadian rhythm, disturbed socio-temporal patterns, and social support, stress, smoking, poor diet, and lack of exercise.

II. AIMS AND OBJECTIVES

1. Primary objectives

- To quantify the prevalence of job stress among the I.T/I.T.E.S professionals in Bangalore, India.
- To quantify the prevalence of hypertension among the I.T/I.T.E.S professionals in Bangalore, India.
- To quantify the relationship of job stress to quality of health & musculoskeletal symptoms in I.T/I.T.E.S professionals at Bangalore, India.

2. Secondary objectives

- To examine the association of job stress and hypertension among IT/ITES professionals
- To examine the association of job stress and quality of life & musculoskeletal symptoms among IT/ITES professionals
- To describe the characteristics and sexual risk behaviors of IT/ITES professionals.

The current study will be useful to determine the prevalence of several risk factors such as job stress, symptoms of musculoskeletal diseases, sexual risks and hypertension among I.T/I.T.E.S professionals.

III. **Systematic Review:** A systematic review of the literature on job stress and hypertension was conducted prior to implementing the study of IT/ITES workers in India. The updated results of the meta-analysis are included in this chapter.

Job stress and hypertension: A systematic review and meta-analysis of observational studies.

Introduction

Worldwide about 13.5% (around 8 million) premature deaths and 6.0% Disability Adjusted Life Years (DALYs) (92 million) were attributed to high blood pressure (33). According to the report on Global Burden of Diseases, 2001 (GBD)(15), blood pressure related diseases have killed more than 50 million people, disabled many more and consumed billions of health care investments in Low and middle income countries (LMIC) (34). LMICs shoulder 80% of blood pressure related disease burden, nearly half of which is in people of working age (45- 69 years). Abundant evidence has been reported for a strong association of job stress with elevated blood pressure(35-46). However, there is also some evidence reporting an inverse association between job stress and blood pressure. (47-51)

It is important to investigate the role of environmental factors specifically for job stress at the macro level in the etiology of hypertension. We, therefore, systematically reviewed studies on hypertension among working populations and synthesized the evidence and performed a meta-

analysis to answer the question – Is job stress associated with hypertension? Answering this clinical query is important, because job stress is a modifiable risk factor amenable to proactive public health intervention.

Methods for systematic review: A comprehensive systematic review was conducted with a predefined review protocol developed by the reviewer, for search strategies, inclusion and exclusion criteria, data extraction, study quality rating criteria, summary of evidence and plan for analysis.

Criteria for study inclusion: Only studies done of occupational workforces were included, in whom the diagnosis of hypertension was done either as a reported variable or as a diagnosis made by a physician (equivalent to stage.1 Hypertension, JNC VII). The other criterion for inclusion was that occupational stress in any form should have been documented as an integral part of the study. We involved only studies published in the English literature.

In addition, for case control studies, the study had to compare participants with hypertension with control individuals without a diagnosis. Participants included both genders and had to be at least 18 years of age. We excluded experimental studies, interventional studies and studies of personality disorders. We also excluded studies that measured coping or any other strategy adapting to stress in any form. Psychiatric diagnoses such as anxiety and depression were not included. We also excluded articles that involved only physical stress, chemical factors and factors that are not part of psychosocial forms of occupational stress.

Search Strategy: For the purpose of the review, we defined job stress as "A set of psychosocial factors experienced by workers due to work conditions, generated as composite experiences resulting from processes at different levels within the organization". Similar

definitions have been adopted in developing models of Job stress. (52, 53) These determinants include both the stressors in the work environment and the effect on the individual.

We conducted a complete search of all the articles from the year 1908 to January 20, 2012 in EMBASE through search strategy and terms. The search terms are displayed in Panel-1. The search terms were selected from the MeSH database, selecting 5 of 95 terms related to stress, and also terms suggested by MeSH ('see also'). The search terms included all forms of studies on hypertension with any form of psychosocial stress as per our definition. Both these search terms were limited to occupational settings. We included both prevalence and incidence measures. We also included review articles to identify further articles for inclusion. We also screened articles in the public health database maintained by CAB Direct at the biomed library of University of California Los Angeles. CAB Direct is a public health database emphasizing international health issues, consisting of the Global health current file (1973 to present) and the Global health archive (1908 to 1973), which also includes records from the British Bureau of Hygiene and Tropical Diseases up to 1983. (54) (Panel.1) We did not restrict the preliminary search based on language to include as many as articles in the preliminary search.

Panel.1: Search Terms

1. hypertension/ or exp hypertension, malignant/ or exp* hypertension, renal/ or exp hypertension, renovascular/ or exp hypertensive retinopathy/ or exp masked hypertension/ or exp white coat hypertension/
2. exp Stress, Psychological/
3. occupational diseases/ or exp sleep disorders, circadian rhythm/
4. exp Occupational Exposure/ or exp Job Satisfaction/ or exp Burnout, Professional/ or exp Employment/
5. exp Prevalence/
6. exp Incidence/
7. exp Cross-Sectional Studies/
8. exp Cohort Studies/
9. Combination of the options of search terms 5 *or* 6 *or* 7 *or* 8 above
10. Combination of the options of search terms 2 *or* 3 *or* 4 above
11. Combination of the options of search terms 1,9 and 10 above
12. Limit 11 to "review articles"

Legend: * 'exp': means 'Explode': *By selecting "Explode" for a given term, it generates the scope notes, broader terms, narrower terms, and entry class.(55) It is a high-level search term to search for many terms at once. The explosion facility within a database makes use of the hierarchical thesaurus.*

Extraction of Data: As the first step, we included articles with a title and abstract fulfilling the inclusion criteria. Several studies were excluded during this phase. We also included 20 articles based on consultation with experts and authors of earlier systematic reviews. We crosschecked with other databases and earlier reviews to include further articles. During the next step, we downloaded the full text of the articles for review. We extracted the following information from the full texts: First author, year, country, study settings such as whether occupational or community based, age, gender, occupation, sample characteristics, study design employed, inclusion criteria by authors, whether job stress was measured or not including the instruments for measuring them, cut-off points for hypertension. Further, we assessed the quality of the studies by keeping Preferred Reporting Items for Systematic Reviews and Meta-Analysis (56) guidelines as reference. The aim of these guidelines is to help authors report a wide array of systematic reviews to assess the benefits and harms of a health care intervention. PRISMA focuses on ways in which authors can ensure the transparent and complete reporting of systematic reviews and meta-analyses.(57)

The criteria for assessing the quality of articles were the following: appropriate study design, sufficient sample size, documented occupation of the participants, and characteristics of participants, adequate instruments used for measuring job-stress and measurement of blood pressure. Specific attention was paid to detection and control of confounding and reporting errors to minimize selection bias and reporting and strategies to tackle measurement error.

Statistical analysis: The meta-analysis and meta-regression were performed using STATA version 10. Pooled odds ratios were combined together for over all estimates. Three independent reviewers (GRB, JT and TM) checked each full-text report for eligibility, and extracted and tabulated all relevant data. Disagreement was resolved by consensus between all authors. If there was more than one report relating to the same study, the report with the

information most relevant to our analysis was included. We also excluded web appendix for studies and supplementary materials during full-text review.

The meta-analysis was performed using Review manager 5.1 version. Pooled raw odds ratios reported in selected studies were combined together using Generic Inverse variance for overall estimates. We tried to obtain additional studies from authors but due to paucity of time in completing the review, the articles that were costing very high and were of other languages weren't included in the review. All procedures conformed to the guidelines for meta-analysis of observational studies in epidemiology.(58, 59) We used RevMan (version 5) for developing flow chart, following the methodology and to calculate unadjusted summary estimates with 95% CIs, using a random-effects model for all analyses.(60) Small-study bias and publication bias were assessed with funnel-plot analysis. RRs were unadjusted because they were calculated from raw data. We measured heterogeneity using I^2 statistic. This statistic describes the percentage of total variation across studies that is due to heterogeneity rather than chance.(61) I^2 can be readily calculated from basic results obtained from a typical meta-analysis as $I^2 = 100\% \times (Q - df)/Q$, where Q is Cochran's heterogeneity statistic and df the degrees of freedom. (61) Negative values of I^2 were put equal to zero so that I^2 lies between 0% and 100%. (61, 62)

The I^2 test was used to measure statistical heterogeneity across studies. The uncertainty around heterogeneity was explored with sub-group sensitivity analysis. Further, heterogeneity was explored in meta regression and the following covariates compared to for possible explanation for heterogeneity: region, age group, gender, measurement, study design, and duration of follow-up. The coefficient for each covariate was checked for statistical significance with p value <0.05.This method has been considered as a valid method for combining estimates from different types of study designs and to pool common estimate of interest.(63)

Results

Search results:

The Initial search identified n=1020 studies. We cross checked for earlier systematic reviews, and recruited 20 additional studies, which were not identified through our initial search. After the check for duplicates, 148 out of 894 studies were included for further assessment and 34 studies satisfied our criteria and were included in the review. (See figure 1) However, only 17 studies had sufficient information to allow meta-analysis for pooled estimates.

We didn't include 29 articles as they were written in languages other than English and 23 articles were not traceable due to accessibility issues. After careful review, we rejected another 81 articles. The primary reasons for rejection was that no occupational group was defined (18), Blood Pressure reactivity defined as physiological response to stimuli was measured instead of direct measurement (15), studies targeted either some intervention or were done in a clinical setting (10), editorial and reviews (9), job stress was not the exposure of interest (8) and had outcomes apart from Hypertension (6). Other reasons were difficulty in interpreting the measure of association used for outcome (5), no psychosocial stress (2), no direct assessment of job stress (2), studies that involved coping (2) and other language (1) Further, we considered another eight articles for qualitative review but we could not include them because they lacked estimates that could be used in the meta-analysis.(64-69) The age group of the participants ranged from 15 to 65 years. Four studies recruited only male participants (1-4).

Measurement of exposure and outcome:

Job stress was mainly measured using Karasek's job strain; nine out of 19 studies applied Karasek's job strain(2;6-13),and job content questionnaire(1;4;12).

Many theoretical models and concepts have been developed in job stress research, but the dominant model during the last few decades has been the Job Demand and Control model of Karasek (1979) and Theorell (54) (56) This model is based on two dimensions; job demands and job control, or decision latitude. The authors mention that "decision latitude is determined to a great extent by the content of work in the occupation, whereas the demands and social support to a greater extent reflect local work site conditions and individual perception" (70) This model assesses job stress from the perspective of worker perceptions of the environment. The validity, the operationalization, and the theoretical and conceptual under- standing of this model has been tested and verified across several occupations and regions.(71-74)

Methodological qualities of included studies:

7 of the 17 articles included were cohort studies (75-81) and seven (7) were cross-sectional (82-88). Confounding factors were reported and adjusted in 16 out of 17 studies; in three studies the confounders were either reported or adjusted. Only six studies discussed selection bias. 9 out of 17 studies did not report measurement error. Two studies reported but did not discuss measurement error. (Table-1)

Overall combined effect of job stress on blood pressure:

The studies were analyzed by study design to estimate the overall effect of job stress on hypertension. We found no association from pooled estimates in cross-sectional and cohort studies. However, the pooled estimate was statically significant for case control studies at 3.69 (95% CI 2.32 to 5.88). The heterogeneity around this estimate was, I^2 statistic 0% indicating less variability among the included case control studies (see Figure. 2). A value of 0% indicates no observed heterogeneity, and larger values show increasing heterogeneity. (61, 62)

Discussion

Our systematic review and meta-analysis found no statistically significant association between job stress and hypertension for pooled estimates in cross-sectional and cohort studies. However, the pooled estimate was statistically significant for case control studies. On examination of the spread of the confidence intervals, most of the studies reported odds ratios that related job stress and Hypertension, although not statistically significant for cross-sectional and cohort studies.

The discrepancy in the evidence is partly explained by following putative reasons;

First, there are several different construct and operationalized definitions of job stress embedded in the literature.(24, 26) An exhaustive but not exclusive list of such constructs would include Karasek and Theorell's model combining job demands and control (89), Occupational Stress Index (OSI) (27) that integrates several paradigms of stress-related cardiovascular dysfunction, Hockey's construct of "resources," or total burden upon the human operator as an integrative model(90), the "Effort-Distress Model" of Folkow (91), Job Content paradigms (JCQ)(92, 93), Demand-Control constructs (DCQ)(94), the Work Organization Matrix (WOM) for imputing job title averages of job characteristics to study subjects(95-98) and the effort-reward imbalance (ER1) model of work stress.(99)

Second, there was heterogeneity of blood pressure measurements, with several studies relying on readings at clinic (100) on only point estimates of BP (101) and only on ambulatory BP (65, 68, 102, 103) while several other studies considered change in blood pressure over time as the main outcome.(104-111)

Third, there was heterogeneity among the studied populations. Most of the studies included occupational groups, which may or not have been exposed to high levels of job stress. For example, IT / ITES professionals are expected to experience high levels of stress but were less studied. (7, 11, 17, 22, 23, 25, 112) Earlier reviews have detailed the role of anxiety, anger control, social support and psychosocial stress on Hypertension. (113) However, findings of these reviews remained inconclusive. (114-116). Our reviews include four studies included from earlier review. (114) The number of articles differs from earlier reviews due to different inclusion criteria (using occupational stress as exposure of interest) from that of our study. We have examined these reviews and have updated their results. The use of heterogeneous job stress instruments has furthermore complicated assessment of stress-hypertension association in the work settings. Despite the presence of several theories for understanding this mechanism, very little research exists on contextually relevant stress factors and individual perception of job stress in several workforces. Compared to earlier reviews, we included three major types of study designs: cohort, case-control studies and cross-sectional studies. The reason for inclusion of cross-sectional studies was to obtain the prevalence of job-stress and hypertension. Our aim of inclusion of cohort and case-control was to decrease the propensity for bias and to get some measure of causality. We wanted to obtain a summary estimate by combining all the studies together while the analysis for cross-sectional studies was done separately from other studies to obtain the priori estimates for our study. (114-116)

Low and Middle Income Countries (LMIC's) have the opportunity of learning from successful evidence based interventions in United States (US), and other developed countries in improving the health status of workforce. However as found in this review, heterogeneity of measurements in job stress and hypertension makes it difficult to apply the evidence from developed countries to LMIC's. Hence, there is a need to pursue research on factors, which are specific to accelerating morbidity among working populations in developing countries. India has a

population of 1.1 billion people making up one sixth of the world's population and is home to perhaps the maximum morbidity in a single country anywhere in the world. The size of population, higher prevalence of risk behaviors, the sudden increase in a new economic class of higher middles class with increased purchasing power and the dependence of the Indian economy on productivity of middle class factors have great importance in studying the health profile among working professionals. (117-119)

Table.1: Description of included studies in meta-analysis

Cohort Studies – (9, with total Person Years 182172)

First Author	*Year*	*Person Years*	*Occupation*	*Participants*	*Job-Stress*	*Hypertension*	*Confounding*	*Selection bias*	*Measurement error*
Guimont, C	2006	40431.6	white-collar workers in 22 organizations in Quebec	Age: 18-65	Karasek's job strain	Averages of 2 measurements at baseline and taken at follow-up	Reported and controlled	NR	NR
Levenstein*	2001	47140		Adults	Job (2 single items), social alienation	Use of BP drugs self-reported	Reported and controlled		
Markovitz, J.H	2004	40920	Workers in CARDIA	18-24, 25-30	Karasek's job strain	SBP ≥ 160/diastolic BP [DBP] ≥ 95	Reported and controlled	Loss to follow-up is not discussed	Not discussed
Nakanishi*	2001	4705		35-54	Work hours	BP ≥ 140/90mmHg or use of BP drugs	Reported and controlled		
Odahara, T.	2010	10738	Workers attending Hitachi Health Care Center	Age:43.1+-6.76	Questionnaire designed by Hitachi Health Care Center	SBP ≥ 160/diastolic BP [DBP] ≥ 95	Reported and controlled	Not discussed	Mentioned & discussed
Peter, R.	1998	14300	Employed persons in Stockholm	19 to 70	Effort-Reward imbalance	SBP ≥ 160/diastolic BP [DBP] ≥ 95	Reported and controlled	Mentioned but not discussed in detail	Mentioned but not discussed in detail
Radi S	2005	17909	French working population		Karasek's job strain	SBP >140 mm Hg DBP >90 mm Hg	Reported and controlled	Excellent discussion of selection bias	Mentioned & discussed

Case-control studies– (4, with sample 1481)

First Author	*Year*	*Sample*	*Occupation*	*Participants*	*Job-Stress*	*Hypertension*	*Confounding*	*Selection bias*	*Measurement error*
Landsbergis	2003	264 - 88 cases	Several Departments	176 controls	Karasek's job strain	Based on the average of the last two (of three) casual blood pressure measurements; DBP greater than 85 mm Hg	Reported and controlled	Excellent discussion of selection bias	Excellent discussion of measurement error
Radi*	2005	565 - 203 cases	French working population	41.8±7.8 men, 43.5±7.5	Job content questionnaire	BP ≥ 140/90mmHg or use of BP drugs	Reported and controlled		

		and 406 controls		women				
Schnall*	1990	87 cases and 128 controls	Several departments	Men, 30 to 40 years	Job content questionnaire	DBP 485mmHg	Reported and controlled	

Cross-sectional studies- (7, with sample size=22437)

First Author	*Year*	*Sample*	*Occupation*	*Participants*	*Job-Stress*	*Hypertension*	*Confounding*	*Selection bias*	*Measurement error*
Trudel, X	2010	2357	white-collar workers	910 men and 1447 women. Mean age:44 years	Karasek's job strain	SBP >140 mm Hg DBP >90 mm Hg	Reported and controlled	Not discussed	Not discussed
Tsutsumi, A.	2001	6587	Workers from rural communities	3187 men; 3400 women	Karasek's job strain	SBP >140 mm Hg DBP >90 mm Hg	Reported and controlled	Not discussed	Mentioned & discussed
Albright	1992	1396	San Francisco bus drivers	20-65 years, mean age 42	Karasek's job strain	Mean of 2nd & 3rd Hypertension >140 mm Hg	Reported and controlled	Discussed	Mentioned & discussed
Alfredsson	2002	10382	Employees of 60 companies	15- 64 years	Karasek's job strain	Mean of two reading SBP >140 mm Hg DBP >90 mm Hg	Excellent reporting and control	Excellent discussion of selection bias	Excellent discussion of measurement error
Curtis	1997	1001	Pitt county residents	age; 25-50,	Karasek's job strain	160/95	Well adjusted	Well discussed	Well discussed
Landsbergis, P.A	1994	262	8 worksites in New York	Age: 44.3	Job Content Questionnaire	SBP >140 mm Hg DBP >90 mm Hg	Reported and controlled	Not discussed	Not discussed
Yu, S.F.	2008	452	Workers in thermal plant	165 female, Age:22-58	Effort-Reward imbalance	SBP >140 mm Hg DBP >90 mm Hg	NR	Reported	Reported

* Also included in earlier systematic review.

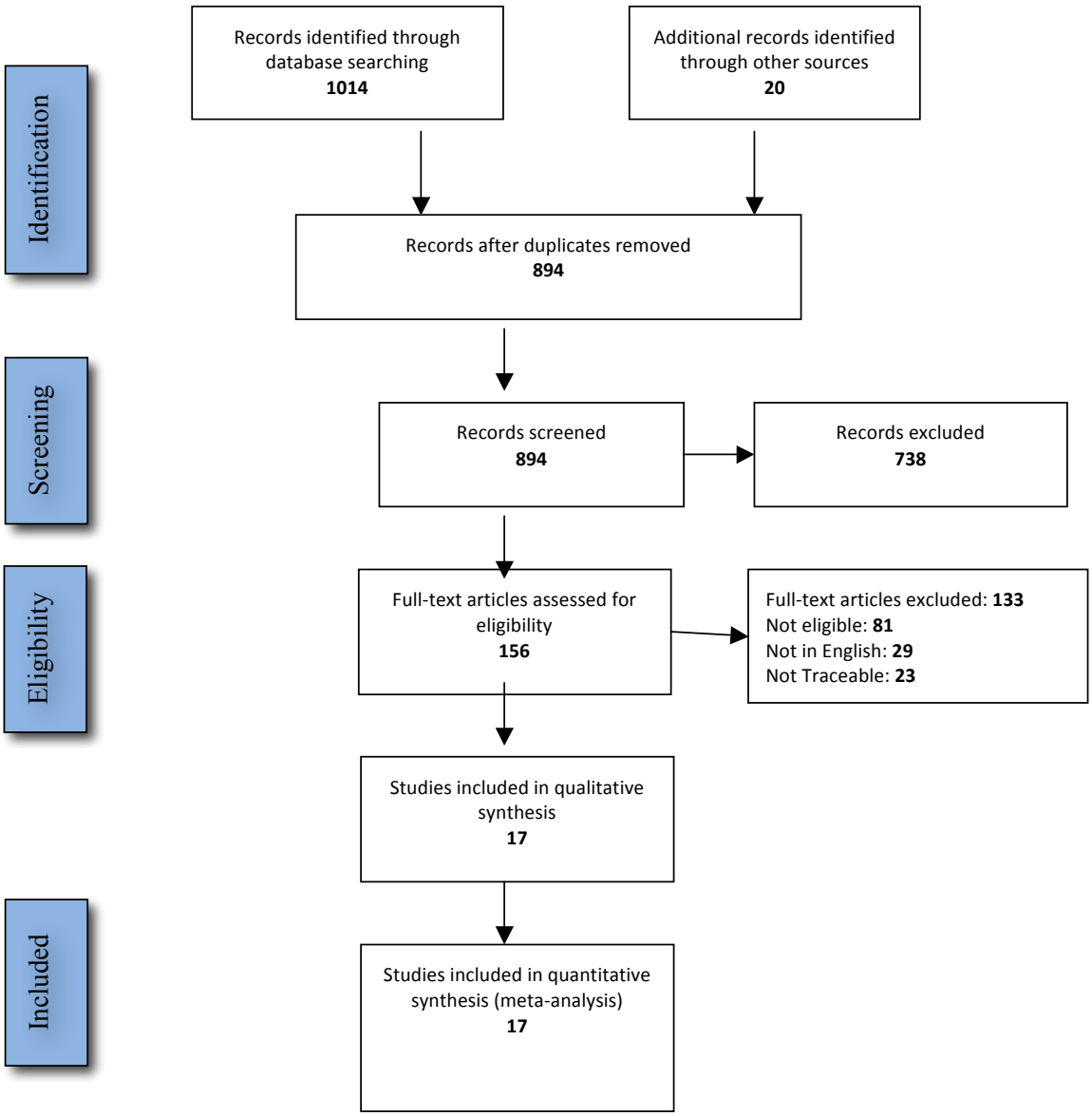

Fig.1: Study flow diagram- Systematic review of Job stress with Hypertension

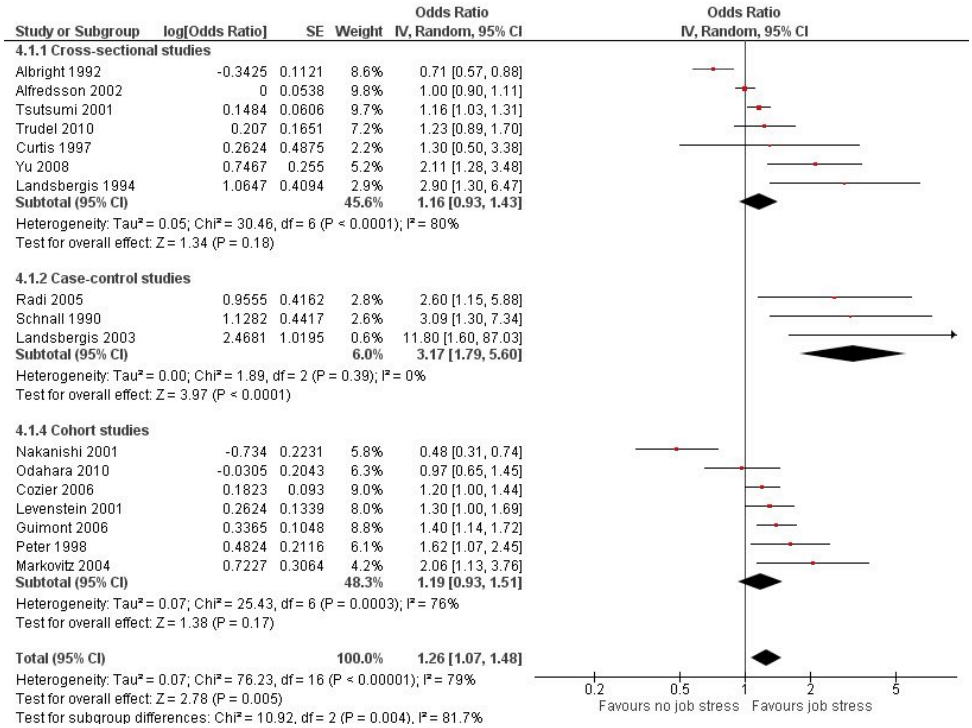

Figure 2: Meta-analyzed odds ratio estimates for job stress and hypertension

References:

1. Reddy KS. India Wakes Up to the Threat of Cardiovascular Diseases. Journal of the American College of Cardiology. 2007:j.jacc.2007.04.097.
2. Lawes C, Hoorn SV, Rodgers A. Global burden of blood-pressure-related disease, 2001. The Lancet. 2001;371(9623):1513-8.
3. Kearney PM, Whelton M, Reynolds K, Muntner P, Whelton PK, He J. Global burden of hypertension: analysis of worldwide data. The Lancet. 2005;365(9455):217-23.
4. Kearney PM, Whelton M, Reynolds K, Whelton PK, He J. Worldwide prevalence of hypertension: a systematic review. Journal of hypertension. 2004;22(1):11.
5. Snehalatha C, Ramachandran A. Cardiovascular risk factors in the normoglycaemic Asian-Indian population—influence of urbanisation. Diabetologia. 2009;52(4):596-9.
6. Gupta R. Burden of coronary heart disease in India. Indian Heart J. 2005 20060308;57(6):-638.
7. Padmavati S. Epidemiology of Cardiovascular Disease in India: I. Rheumatic Heart Disease. Circulation. 1962;25(4):703-10.
8. Chadha SL, Radhakrishnan S, Ramachandran K, Kaul U, Gopinath N. Epidemiological study of coronary heart disease in urban population of Delhi. The Indian journal of medical research. 1990;92:424-30.
9. Gupta S, Malhotra K. Urban--rural trends in the epidemiology of coronary heart disease. The Journal Of The Association Of Physicians Of India. 1975;23(12):885-92.
10. Reddy KS, Prabhakaran D, Shah P, Shah B. Differences in body mass index and waist : hip ratios in North Indian rural and urban populations. Obesity Reviews. [10.1046/j.1467-789X.2002.00075.x]. 2002;3(3):197-202.
11. Gupta R, Gupta VP, Sarna M, Bhatnagar S, Thanvi J, Sharma V, et al. Prevalence of coronary heart disease and risk factors in an urban Indian population: Jaipur Heart Watch-2. Indian heart journal. 2002;54(1):59-66.
12. Prabhakaran D, Shah P, Chaturvedi V, Ramakrishnan L, Manhapra A, Reddy KS. Cardiovascular risk factor prevalence among men in a large industry of northern India. National Medical Journal of India. 2005;18(2):59.
13. Beaglehole R, Bonita R, Horton R, Adams C, Alleyne G, Asaria P, et al. Priority actions for the non-communicable disease crisis. The Lancet. 2011.
14. Yusuf S, Hawken S, √îunpuu S, Dans T, Avezum A, Lanas F, et al. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. The Lancet. 2004;364(9438):937-52.
15. Murray CJL, Lopez AD. The global burden of disease. Geneva: WHO. 1996;270.
16. Organization WH. The World Health Report. Making a Difference. Geneva1999.
17. Kristensen TS. Cardiovascular diseases and the work environment: A critical review of the epidemiologic literature on nonchemical factors. Scandinavian Journal of Work, Environment & Health. 1989;15(3):165-79.
18. Yusuf S, Reddy S, √îunpuu S, Anand S. Global Burden of Cardiovascular Diseases. Circulation. 2001;104(23):2855-64.
19. Ezzati M, Lopez AD. Estimates of global mortality attributable to smoking in 2000. The Lancet. 2003;362(9387):847-52.
20. Raymond S. Foreign Assistance in an Aging World. Foreign Affairs. 2003;82(2):91-105.
21. Bloom DE, Canning D, Sevilla J. The demographic dividend: a new perspective on the economic consequences of population change: Rand Corp; 2003.
22. Gupta R. Burden of coronary heart disease in India. 2005.
23. Steyaert J, Gould N. Social Work and the Changing Face of the Digital Divide. British Journal of Social Work. 2009;39(4):740-53.
24. Belkic K. The Forebrain: Central stress mechanisms and Cardiovascular Responses. 2000.
25. Singh J. Price of Success. The Tribue, Spectrum. 2007 Oct 14 2007, .

26. Belkic K, Schnall P, Landsbergis P, Baker D. The workplace and cardiovascular health: conclusions and thoughts for a future agenda. Occup Med. 2000 20000225;15(1):-321.
27. Belkic K SC, Theorell T, Cizinsky S. Work Stressors and Cardiovascular Risk Assessment for Clinical Practice. Part I. : National Institute for Psychosocial Factors and Health, Section for Stress Research; 1995.
28. Leichter HM. Free to be foolish: politics and health promotion in the United States and Great Britain: Princeton University Press Princeton, NJ; 1991.
29. Upadhya C. Controlling offshore knowledge workers: Power and agency in India's software outsourcing industry. New Technology, Work and Employment. [10.1111/j.1468-005X.2008.00215.x]. 2009;24(1):2-18.
30. Rohith K, Shrinivas K, Sudhashree V. Issues and concerns of health among call center employees. Indian Journal of Occupational and Environmental Medicine. 2005;9(3):129-32.
31. Boggild H, Knutsson A. Shift work, risk factors and cardiovascular disease. Scand J Work Environ Health. 1999;25(2):85-99.
32. Harrington JM. Health effects of shift work and extended hours of work. Occupational and Environmental Medicine. 2001;58(1):68-72.
33. Lawes CMM, Hoorn SV, Rodgers A. Global burden of blood-pressure-related disease. The Lancet. 2001;371(9623):1513-8.
34. MacMahon S, Alderman MH, Lindholm LH, Liu L, Sanchez RA, Seedat YK. Blood-pressure-related disease is a global health priority. Journal of hypertension. 2008;26(10):2071.
35. Alfredsson L, Karasek R, Theorell T. Myocardial infarction risk and psychosocial work environment: an analysis of the male Swedish working force. Social science & medicine. 1982;16(4):463-7.
36. Aro S. Occupational stress, health-related behavior, and blood pressure: a 5-year follow-up. Preventive medicine. 1984;13(4):333-48.
37. AZ LaCroix SHIBR, Baruch G, Beiner L. Gender differences in the stressfulness of work place roles: a focus on work and health. Barnett R BG, Beiner L, editor. New York, NY:: Free Press 1987.
38. Cobb S, Rose RM. Hypertension, Peptic Ulcer, and Diabetes in Air Traffic Controllers. JAMA: The Journal of the American Medical Association. 1973;224(4):489-92.
39. House JS, Wells JA, Landerman LR, McMichael AJ, Kaplan BH. Occupational stress and health among factory workers. Journal of Health and Social Behavior. 1979:139-60.
40. Karasek R, Baker D, Marxer F, Ahlbom A, Theorell T. Job decision latitude, job demands, and cardiovascular disease: a prospective study of Swedish men. American journal of public health. 1981;71(7):694-705.
41. Karasek RA, Theorell T, Schwartz J, Pieper C, Alfredsson L. Job, psychological factors and coronary heart disease. Swedish prospective findings and US prevalence findings using a new occupational inference method. Advances in Cardiology. 1982;29:62.
42. Karasek RA, Theorell T, Schwartz JE, Schnall PL, Pieper CF, Michela JL. Job characteristics in relation to the prevalence of myocardial infarction in the US Health Examination Survey (HES) and the Health and Nutrition Examination Survey (HANES). American journal of public health. 1988;78(8):910-8.
43. Karasek. RA, Russell, Theorell T. Physiology of stress and regeneration in job related cardiovascular illness. Journal of Human Stress. 1982;8(1):29-42.
44. Matthews KA, Cottington EM, Talbott E, Kuller LH, Siegel JM. STRESSFUL WORK CONDITIONS AND DIASTOLIC BLOOD PRESSURE AMONG BLUE COLLAR FACTORY WORKERS. American Journal of Epidemiology. 1987;126(2):280-91.
45. Schnall PL, Pieper C, Schwartz JE, Karasek RA, Schlussel Y, Devereux RB, et al. The relationship between'job strain,'workplace diastolic blood pressure, and left ventricular mass index. JAMA: the journal of the American Medical Association. 1990;263(14):1929-35.
46. Van Dijkhuizen N, Reiche H. Psychosocial stress in industry: a heartache for middle

management? Psychotherapy and Psychosomatics. 1980;34(2-3):124-34.
47. House JS, Strecher V, Metzner HL, Robbins CA. Occupational Stress and Health Among Men and Women in the Tecumseh Community Health Study. Journal of Health and Social Behavior. 1986;27(1):62-77.
48. Linden W, Feuerstein M. Essential Hypertension and Social Coping Behavior: Experimental Findings. Journal of Human Stress. 1983 1983/09/01;9(3):22-31.
49. Meyer E DL, Miller M, Reading A. . Hypertension and psychological stress. . Psychosomatics. 1978;19:160-8.
50. REED DM, LACROIX AZ, KARASEK RA, MILLER D, MACLEAN CA. Occupational strain and the incidence of coronary heart disease. American Journal of Epidemiology. 1989;129(3):495-502.
51. WINKLEBY MA, Ragland DR, Syme SL. Self-reported stressors and hypertension: evidence of an inverse association. American Journal of Epidemiology. 1988;127(1):124-34.
52. Karasek R TT. Healthy Work. . New York: Basic Books.; 1990.
53. Siegrist J. Adverse health effects of high-effort/low-reward conditions. Journal of Occupational Health Psychology. 1996;1(1):27-41.
54. Health CAaG. Global health database. Los Angeles2012 [cited 2012 January 20].
55. Greenhalgh T. How to read a paper: the Medline database. Bmj. 1997;315(7101):180-3.
56. Moher D, Liberati A, Tetzlaff J, Altman DG, The PG. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med. 2009;6(7):e1000097.
57. Moher D, Liberati A, Tetzlaff J, Altman DG, Group tP. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. Annals of Internal Medicine. 2009 August 18, 2009;151(4):264-9.
58. GREENLAND S. QUANTITATIVE METHODS IN THE REVIEW OF EPIDEMIOLOGIC LITERATURE. Epidemiologic Reviews. 1987 January 1, 1987;9(1):1-30.
59. Stroup DF, Berlin JA, Morton SC, Olkin I, Williamson GD, Rennie D, et al. Meta-analysis of observational studies in epidemiology. JAMA: the journal of the American Medical Association. 2000;283(15):2008-12.
60. Collaboration C. Review Manager (RevMan) Version 5.0. Copenhagen: The Nordic Cochrane Centre, The Cochrane Collaboration[Computer programme]. 2008.
61. Higgins JP, Thompson SG. Quantifying heterogeneity in a meta-analysis. Stat Med. 2002 Jun 15;21(11):1539-58.
62. Julian PTH, Simon GT, Jonathan JD, Douglas GA. Measuring inconsistency in meta-analyses. BMJ. 2003;327.
63. Harris R, Bradburn M, Deeks J, Harbord R, Altman D, Sterne J. metan: fixed- and random-effects meta-analysis. Stata Journal. 2008;8(1):3-28.
64. Frommer MS, Edye BV, Mandryk JA, Grammeno GL, Berry G, Ferguson DA. Systolic blood pressure in relation to occupation and perceived work stress. Scandinavian Journal of Work, Environment & Health. 1986;12(5):476-85.
65. Light KC, Turner JR, Hinderliter AL. Job strain and ambulatory work blood pressure in healthy young men and women. Hypertension. 1992 19920828;20(2):-218.
66. Schnall PL, Landsbergis PA, Pieper CF, Schwartz J, Dietz D, Gerin W, et al. The impact of anticipation of job loss on psychological distress and worksite blood pressure. American Journal of Industrial Medicine. [10.1002/ajim.4700210314]. 1992;21(3):417-32.
67. Theorell T, Ahlberg-Hulten G, Jodko M, Sigala F, De La Torre B. Influence of job strain and emotion on blood pressure in female hospital personnel during workhours. Scandinavian Journal of Work, Environment & Health. 1993;19(5):313-8.
68. Theorell T, De Faire U, Johnson J, Hall E, Perski A, Stewart W. Job strain and ambulatory blood pressure profiles. Scand J Work Environ Health. 1991;17(6):380-5.
69. Tobe SW, Kiss A, Szalai JP, Perkins N, Tsigoulis M, Baker B. Impact of Job and Marital

Strain on Ambulatory Blood Pressure: Results from the Double Exposure Study. American Journal of Hypertension. 2005;18(8):1046-51.
70. Theorell Tr, Karasek RA. Current issues relating to psychosocial job strain and cardiovascular disease research. Journal of Occupational Health Psychology. 1996;1(1):9-26.
71. Kasl SV. The influence of the work environment on cardiovascular health: A historical, conceptual, and methodological perspective. Journal of Occupational Health Psychology. 1996;1(1):42-56.
72. de Jonge J, van Breukelen GJP, Landeweerd JA, Nijhuis FJN. Comparing Group and Individual Level Assessments of Job Characteristics in Testing the Job Demand-Control Model: A Multilevel Approach. Human Relations. 1999;52(1):95-122.
73. Kristensen TS. The demand-control-support model: Methodological challenges for future research. Stress Medicine. [10.1002/smi.2460110104]. 1995;11(1):17-26.
74. Peters T WR. “Work Factors and Stress: A Critical Review” CL P, editor: New York: Basic Books.; (1994).
75. Cozier Y, Palmer JR, Horton NJ, Fredman L, Wise LA, Rosenberg L. Racial Discrimination and the Incidence of Hypertension in US Black Women. Annals of Epidemiology. 2006;16(9):681-7.
76. Guimont C, Brisson C, Dagenais GR, Milot A, V√©zina M, M√¢sse BÆ, et al. Effects of Job Strain on Blood Pressure: A Prospective Study of Male and Female White-Collar Workers. American journal of public health. 2006 2006/08/01;96(8):1436-43.
77. Levenstein S, Smith MW, Kaplan GA. Psychosocial Predictors of Hypertension in Men and Women. Archives of Internal Medicine. 2001;161(10):1341-6.
78. Markovitz J, Matthews K, Whooley M, Lewis C, Greenlund K. Increases in job strain are associated with incident hypertension in the CARDIA study. Annals of Behavioral Medicine. 2004;28(1):4-9.
79. Nakanishi N, Yoshida H, Nagano K, Kawashimo H, Nakamura K, Tatara K. Long working hours and risk for hypertension in Japanese male white collar workers. Journal of Epidemiology and Community Health. 2001;55(5):316-22.
80. Odahara T, Irokawa M, Karasawa H, Matsuda S. Detection of Exaggerated Blood Pressure Response Using Laboratory of Physical Science Protocol and Risk of Future Hypertension. Journal of Occupational Health. 2010;52(5):278-86.
81. Peter R, Alfredsson L, Hammar N, Siegrist J, Theorell T, Westerholm P. High effort, low reward, and cardiovascular risk factors in employed Swedish men and women: baseline results from the WOLF Study. Journal of Epidemiology and Community Health. 1998;52(9):540-7.
82. Albright CL, Winkleby MA, Ragland DR, Fisher J, Syme SL. Job strain and prevalence of hypertension in a biracial population of urban bus drivers. American journal of public health. 1992;82(7):984-9.
83. Alfredsson L, Hammar N, Fransson E, de Faire U, Hallqvist J, Knutsson A, et al. Job strain and major risk factors for coronary heart disease among employed males and females in a Swedish study on work, lipids and fibrinogen. Scandinavian Journal of Work, Environment & Health. 2002;28(4):238-48.
84. Curtis AB, James SA, Raghunathan TE, Alcser KH. Job strain and blood pressure in African Americans: the Pitt County Study. American journal of public health. 1997 1997/08/01;87(8):1297-302.
85. Landsbergis PA, Schnall PL, Warren K, Pickering TG, et al. Association between ambulatory blood pressure and alternative formulations of job strain. Scandinavian Journal of Work, Environment & Health. 1994;20(5):349-63.
86. Trudel X, Brisson C, Milot A. Job Strain and Masked Hypertension. Psychosomatic medicine. 2010;72(8):786-93.
87. Tsutsumi A, Kayaba K, Tsutsumi K, Igarashi M. Association between job strain and prevalence of hypertension: a cross sectional analysis in a Japanese working population with a

wide range of occupations: the Jichi Medical School cohort study. Occupational and Environmental Medicine. 2001;58(6):367-73.
88. Yu S-F, Zhou W-H, Jiang K-Y, Gu G-Z, Wang S. Job Stress, Gene Polymorphism of Œ≤2-AR, and Prevalence of Hypertension. Biomedical and Environmental Sciences. 2008;21(3):239-46.
89. Karasek R, Theorell T. Healthy work: stress, productivity, and the reconstruction of working life: Basic books; 1994.
90. Robert G, Hockey J. Compensatory control in the regulation of human performance under stress and high workload: A cognitive-energetical framework. Biological Psychology. 1997;45(1,Äì3):73-93.
91. Folkow B, Schmidt T, Uvn√§s-Moberg K, Henry JP. Stress, health and the social environment: James P. Henry's ethologic approach to medicine, reflected by recent research in animals and man: in memory of a great 20th century physiologist: Blackwell Science; 1997.
92. Hans B, Michael GM, Harry H, Amanda CN, Eric B, Stephen AS. Low job control and risk of coronary heart disease in whitehall ii (prospective cohort) study. BMJ. 1997;314.
93. Karasek R, Brisson C, Kawakami N, Houtman I, Bongers P, Amick B. The Job Content Questionnaire (JCQ): An instrument for internationally comparative assessments of psychosocial job characteristics. Journal of Occupational Health Psychology. 1998;3(4):322-55.
94. Theorell T, Tsutsumi A, Hallquist J, Reuterwall C, Hogstedt C, Fredlund P, et al. Decision latitude, job strain, and myocardial infarction: a study of working men in Stockholm. The SHEEP Study Group. Stockholm Heart epidemiology Program. American journal of public health. 1998 1998/03/01;88(3):382-8.
95. Alfredsson L, Spetz C-L, Theorell Tñ. Type of Occupation and Near-Future Hospitalization for Myocardial Infarction and Some Other Diagnoses. International Journal of Epidemiology. 1985;14(3):378-88.
96. Hammar N, Alfredsson L, Johnson JV. Job strain, social support at work, and incidence of myocardial infarction. Occupational and Environmental Medicine. 1998;55(8):548-53.
97. Johnson JV, Stewart W, Hall EM, Fredlund P, Theorell T. Long-term psychosocial work environment and cardiovascular mortality among Swedish men. Am J Public Health. 1996 19960513;86(3):-331.
98. Johnson JV, Stewart WF. Measuring work organization exposure over the life course with a job-exposure matrix. Scand J Work Environ Health. 1993 19930430;19(1):-28.
99. Siegrist J, Peter R, Junge A, Cremer P, Seidel D. Low status control, high effort at work and ischemic heart disease: prospective evidence from blue-collar men. Soc Sci Med. 1990 19910225;31(10):-1134.
100.Ugljesic M, Belkic K, Boskovic S, Avramovic D. Mickovic Lj: Increased arterial blood pressure during work and risk profile among high-stress occupations: Journalists and city mass transit drivers. Kardiologija. 1992;13:150-4.
101.Smirk F. CASUAL AND BASAL BLOOD PRESSURES IV. THEIR RELATIONSHIP TO THE SUPPLEMENTAL PRESSURE WITH A NOTE ON STATISTICAL IMPLICATIONS. British heart journal. 1944;6(4):176.
102.Schnall PL, Schwartz JE, Landsbergis PA, Warren K, Pickering TG. A longitudinal study of job strain and ambulatory blood pressure: results from a three-year follow-up. Psychosom Med. 1998 19990303;60(6):-706.
103.Van Egeren LF. The relationship between job strain and blood pressure at work, at home, and during sleep. Psychosomatic medicine. 1992;54(3):337-43.
104.Armario P, Del Rey R, Martin-Baranera M, Almendros M, Ceresuela L, Pardell H. Blood pressure reactivity to mental stress task as a determinant of sustained hypertension after 5 years of follow-up. Journal of human hypertension. 2003;17(3):181-6.
105.Brisson C, Laflamme N, Moisan J, Milot A, M√¢sse B, V√©zina M. Effect of family responsibilities and job strain on ambulatory blood pressure among white-collar women.

Psychosomatic medicine. 1999;61(2):205-13.
106.Carroll D, Smith GD, Sheffield D, Shipley MJ, Marmot MG. Pressor reactions to psychological stress and prediction of future blood pressure: data from the Whitehall II study. BMJ. 1995;310(6982):771-5.
107.Carroll D, Smith GD, Shipley MJ, Steptoe A, Brunner EJ, Marmot MG. Blood pressure reactions to acute psychological stress and future blood pressure status: a 10-year follow-up of men in the Whitehall II study. Psychosomatic medicine. 2001;63(5):737-43.
108.Flaa A, Eide IK, Kjeldsen SE, Rostrup M. Sympathoadrenal stress reactivity is a predictor of future blood pressure. Hypertension. 2008;52(2):336-41.
109.Gasperin D, Netuveli G, Dias-da-Costa JS, Pattussi MP. Effect of psychological stress on blood pressure increase: a meta-analysis of cohort studies. Cadernos de Sa√∫de P√∫blica. 2009;25(4):715-26.
110.Hassellund SS, Flaa A, Sandvik L, Kjeldsen SE, Rostrup M. Long-term stability of cardiovascular and catecholamine responses to stress tests. Hypertension. 2010;55(1):131-6.
111.Steptoe A, Marmot M. Impaired cardiovascular recovery following stress predicts 3-year increases in blood pressure. Journal of hypertension. 2005;23(3):529.
112.Gupta A, Gupta R, Sarna M, Rastogi S, Gupta VP, Kothari K. Prevalence of diabetes, impaired fasting glucose and insulin resistance syndrome in an urban Indian population. Diabetes Research and Clinical Practice. 2003;61(1):69-76.
113.Rutledge T, Hogan BE. A quantitative review of prospective evidence linking psychological factors with hypertension development. Psychosomatic medicine. 2002;64(5):758-66.
114.Sparrenberger F, Cichelero F, Ascoli A, Fonseca F, Weiss G, Berwanger O, et al. Does psychosocial stress cause hypertension? A systematic review of observational studies. Journal of human hypertension. 2008;23(1):12-9.
115.Backé E-M, Seidler A, Latza U, Rossnagel K, Schumann B. The role of psychosocial stress at work for the development of cardiovascular diseases: a systematic review. International archives of occupational and environmental health. 2012;85(1):67-79.
116.Rosenthal T, Alter A. Occupational stress and hypertension. Journal of the American Society of Hypertension. 2012;6(1):2-22.
117.Babu G. Do you see an elephant or just its trunk? The need of learning Modern Epidemiologic Methods: An introduction. The Internet Journal of Epidemiology. 2012;10(2).
118.Babu G, Detels R. Prioritizing Social Actions And Involving Community For Prevention Of The Non-Communicable Diseases. The Internet Journal of Epidemiology. 2011;9(2).
119.Babu GR. " Opportunities for improving public health system in India" analysis of current state of affairs and pointers for future. Annals of Tropical Medicine and Public Health. 2011;4(2):69.

Chapter.2. Methods

Abstract

We conducted both qualitative and a cross sectional quantitative studies among professionals working in the I.T and ITES sector in India. The qualitative study included 32 in-depth interviews exploring several risk factors and the health status of the professionals. In the cross sectional study, 1071 volunteers completed self-administered questionnaires containing details about job stress (Occupational Stress Index: OSI and contextual stress domain), musculoskeletal symptoms (Nordic musculoskeletal questionnaire), quality of life (WHOQOL BREF) and sexual behaviors. Further, we took anthropometric measurements and blood pressure. Our study estimated the prevalence of Job stress and its association with Hypertension, quality of life, musculoskeletal symptoms and sexual behaviors.

Understanding the prevalence's of job stress and other risk factors within this specialized workforce and its association with health parameters can help to prevent morbidity related complications. Identification of risk profiles in this workforce can guide worksite interventions to prevent debilitating conditions thereby improving the health and productivity of the workforce.

Key Words: Information Technology, Job Stress, Hypertension, Musculoskeletal symptoms.

Chapter.2. Methods

We conducted a qualitative study and a cross sectional study of workers in the Information Technology (I.T) and Information Technology Enabled Services (ITES) sector in Bengaluru. The "study population" was defined as all persons aged 50 years or under who began to work as IT/I.T.E.S professionals as of 1st January 2010, at twenty-one sites involved in the I.T and ITES sector. (1, 2)

The study comprised both qualitative and quantitative phases. (Figure.1): The objective of the qualitative study was to understand the presence of contextual risk factors (exposure to job stress and other coronary risk factors) for ill health including hypertension among I.T/I.T.E.S professionals. This was followed by a cross sectional study to determine prevalence's of occupational stress, quality of life, musculoskeletal symptoms, sexual behaviour and hypertension among IT professionals.

Study area

The capital of the state of Karnataka, Bengaluru had a population of around 6.8 million in the 2011 census and with the merger of metropolitan areas had grown to 8.5 million.(3) Bengaluru is the 27th largest city in the world and 3rd largest in India by population. (4, 5) (Figure.2)

The Braham Bengaluru Mahanagara Palike (BBMP) is the fourth largest Municipal Corporation in India covering the Greater Bangalore Metropolitan area spread across 741 square kilometers (6) Bengaluru claims to be the IT Capital of India and often is known as the "Silicon valley of India" (7)with the companies in this city accounting for more than 35 percent of India's software exports.(5) During the year 2010, more than 1000 companies were listed as Information Technology (I.T) and Information Technology Enabling Services (ITES) in Bengaluru, India.

Bengaluru has more than 150,000 I.T/I.T.E.S professionals working in Information Technology and IT-Enabled Services.(5) Information Technology Enabled Services (ITES) is the next major driver of the technology services industry with inexpensive telecommunication overheads, a well-established infrastructure and a vast team of English-speaking and computer-literate graduate workers. (8)

Information Technology (IT) is a broad discipline involving the study, design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hardware. IT uses computer technology in managing and processing information, especially in large organizations. (9) In particular, IT deals with the use of electronic computers and computer software to convert, store, protect, process, transmit, and retrieve information. (9) Information technology enabled services (ITES)**:** ITES is a form of outsourced service, which has emerged due to involvement of IT in various fields such as banking and finance, telecom, insurance and others. Some of the examples of ITES are medical transcription, back-office accounting, insurance claims, credit card processing and others. (9) Bengaluru's IT/ITES industry is located predominately in two main zones, one at Electronics City and another at Whitefield. There are several other new clusters in Bellandur, Challaghatta, Bannerghatta road and the Outer and Inner Ring Road and C. V. Raman Nagar. Many other small companies are scattered all over the city. A total of twenty-one sites in these major zones were covered and no major area was left out.

Phase-1. Qualitative Study

Selection of subjects and eligibility criteria

The source population for the study comprised all I.T/I.T.E.S professionals aged 20-59 years working in “technical functions” in I.T/I.T.E.S sector. Technical functions are characterized by involvement in human-computer interface within IT and ITES industries. The inclusion criteria for

participants in the study were: aged between 20-59 years, should have worked for at least 1 year in either IT or ITES industry and should fit the designation of "Technical worker" according to the Revised Indian National Classification of Occupations. (8) (figure.1)

The study was conducted between August 2010 and March 2011 in the city of Bengaluru. We conducted 32 in-depth interviews with I.T/ITES workers, recruited with the assistance of supervisors and H.R Managers (Human resources) in I.T and ITES organizations. Participants were recruited from workers holding different job titles, team leaders, and administrative staff of informal groups. Recruitment of volunteers was done through personal communication as well as with the help of HR managers.

The qualitative study was anonymous. We didn't collect any identifying information from participants such as name, email id, phone number or even name of company. At the outset, the interviewers emphasized the confidentiality and importance of the responses. Potential participants were explained that the study wanted to understand about their work environment and how it affects them, and that this information is not available anywhere else. We took "informed consent", and specifically requested permission to record the interview. Informed consent was obtained from all participants before conducting focus group discussions and in-depth interviews. All the interviews were conducted at a convenient time for professionals in a private room arranged by the investigators.

Data collection and Data management

The interviews were semi-structured, open-ended and were conducted using an interview guide. The interviews were conducted in a flexible manner by allowing as much time as required by the participants to seek insights into each domain of interview guide covering all the questions in the protocol systematically. All interviews were conducted in English. The whole conversation was audio-recorded. The interviewers also took notes on the contents of the interview, focusing on

key phrases and main points made by the respondent.

The interviews started with greeting the participant and introducing the research staff and research objectives. The interview guide explored information on socio-demographic factors, individual experience as IT/ITES professional, quality of work environment, individual's experience with stress, individual's working and non-working environments, awareness about health and hypertension and perceptions, knowledge on "risks to health". The interview guide listed the questions or issues to be explored in the interview and were used to ensure that the same basic lines of inquiry were pursued with each person interviewed. (Appendix.1)

The data collected was entered into an excel sheet and a set of codes were developed to classify the words by categories by using specific software tools dedoose and ATLAS ti. After summarizing all the data, the shared information and opinions of the respondents that emerged from various cross sections of the people were summarized to make the conclusions. The interviewer wrote a detailed text summary of the Focus Group Discussion (FGDs) and in-depth interviews. All transcriptions were entered into the computer using a standardized data entry program for qualitative data, deDoose and ATLAS.ti. (10) More details on this are provided in chapter.3.

Data Analysis

Each member of the research team read through the interview transcripts and identified potential themes or analytic categories by creating memos. This classification of the text involved open coding by the researchers. The researchers underscored participants' words or phrases in the text, which best characterized the work environment and general health risk factors. The final list of codes was constructed through a consensus among team members based on similarity and/or redundancy of the codes. Emerging categories were compared and

reviewed for linkages. Relationships among categories were summarized to answer specific research questions. The detailed description of the emerging themes is provided in chapter.3.

Ethical considerations

The study was anonymous, and no names or other personal identifying information were collected from the participants. Each participant was assigned a unique number and identified only by this number during the process. Quiet private rooms provided by IT/ITES companies were used for collection of information for both qualitative and quantitative studies. The study was reviewed and approved by the UCLA Institutional Review Board (IRB, # G09-12-002-01, IRB#10-001348) and the ethics committee of The Public Health Foundation of India. (TRC-IEC 40/10)

Phase-2. Quantitative Study

The source population comprised all I.T/I.T.E.S professionals aged 20-59 years working in "technical functions" in twenty one selected worksites (units) of the I.T/I.T.E.S sector willing to join the study. By Technical functions, we mean all job categories involved in human-computer interface within these four companies selected for the study.

Selection of subjects and eligibility criteria

We employed a basic Mixed Methods sampling strategy for selecting the IT/ITES professionals to volunteer for the study. Specifically, we chose stratified purposive sampling (quota sampling).(11) For this type of sampling, a stratified nature sampling procedure is characteristic of probability sampling and a small number of units within strata is characteristic of purposive sampling. We selected the group of interest in strata in the first stage (e.g., of clusters of IT/ITES companies scattered over geographical areas) and in the second stage, we selected a small number of units to study intensively within each strata based on purposive sampling techniques.

(11-13) The advantage of this method of sampling is that it allows the researcher to discover and describe in detail characteristics that are similar across the strata or subgroups, as we choose.(11, 12) Our study was done such that we covered each of these main zones. We took at least one IT/ITES sector from each of the major zones in the first stage of sampling and this involved stratification of the locations of IT/ITES companies. The second stage involved selecting companies within the strata of zones having IT/ITES companies. The sampling was done such that three companies each were selected from Electronic City (all IT) and Whitefield (2 IT, 1 ITES), areas that had the maximum number of IT/ITES companies. The remaining 15 sites were selected such that there was one company representing at least every geographical area having IT/ITES companies in Bangalore. (9) We included 1071 subjects in the total sample, 509 subjects in the IT sector and 472 subjects in the ITES sector.(14)

In each zone, permission was sought to conduct the research during health check up camps conducted in the respective industries. The quantitative studies were done in closed rooms with facilities for blood pressure measurements, taking anthropometric measurements and for ensuring privacy of the individuals. Employees were invited to take part in the study after completing routine health check ups organized by the company. On agreement of the volunteer, a questionnaire was handed over. Volunteers then completed the questionnaire in a separate room provided by the companies or completed at their own place of choice and would return at the end of that day or the next day.

The Inclusion criteria were that IT/ITES professionals had to be between 20-59 years of age, should have worked in these sectors for at least one year in either IT or ITES industry and should be a technical worker. A technical worker is a person who is working in positions as per the list approved by according to Revised Indian National Classification of Occupations 2004. (8): -

- 2132: Computer Programmers: 2132.10 Computer Programmer, 2132.20 I.T/I.T.E.S Engineer, 2132.30 Programmer Analyst, 2132.40 Programmer, Engineering and Scientific, 2132.50 System Programmer, 2132.90 Computer Programmers, Other,
- 2139 Computer Professionals: 2139.10 Quality Assurance Analyst (Computers), 2139.20 Data Base Design Analyst, 2139.30, Data Base Administrator, 2139.40 Computer System Hardware Analyst and 2139.90 Computer Professionals
- Data entry operators, customer service support agents, Team members of ITES workers and other ITES job titles.

The *exclusion criteria* included any professional younger than 20 years and older than 59 years, if they belonged to management and support staff workers (Workers who are ***NOT*** directly involved in I.T/I.T.E.S sector; also termed as white collar workers), all the workers whose job designation does not fall in the codes listed in the Inclusion criteria above. eg: - drivers, security guards, vice presidents and workers who have worked for less than 1 year on the date of administration of the interview.

Sample size

To calculate the sample size for a single proportion, we used the formula: [15]

$$n = [Z_{1-\alpha/2}]^2 \, p(1-p)/d^2 \, ,$$

Where a = significance level (0.05), p = expected prevalence of Hypertension, d = desired precision (half of the 95% CI)

The estimated prevalence of Hypertension in the urban Indian population is 10-15%. .(16, 17) (18-21) (22) Using a sample size calculator, (23) with a desired precision of .05, the minimum

sample size is 196 if we assume the prevalence of Hypertension is 15% and 139 if we assume the prevalence of Hypertension is 10%. If the desired precision is .02 the minimum sample size for survey turns out to be 1223 (for p=15%) and 864 (for p=10%). For a desired level of precision of 0.05, and prior prevalence of Hypertension at 12.5%, the total sample size for our study needed to be 169. Further, assuming a refusal rate of 20% we needed to approach I.T/I.T.E.S units with a target of obtaining about 200 primary subjects. The minimum sample size required by assuming prevalence of Hypertension as 10% with desired precision of .02 was 864. Assuming that the prevalence of hypertension does not vary between IT and ITES sector, the total size of sample was 1037 (864+173). By assuming differential prevalence of hypertension among IT and ITES sector, the minimum size of sample needed was 203 subjects in IT/ITES sector by assuming a desired level of precision of 0.05, and a prior prevalence of Hypertension of 10-15%. (169+34=203)

By considering both these options discussed above, we included 1071 subjects in the total sample with 509 subjects in the IT sector and 472 subjects in the ITES sector. For the quantitative study, we invited 1305 IT/ITES professionals to participate in the study. These subjects were the volunteers who walked into the room/corner that had our research staff. Among these 1305 professionals, all of them accepted the questionnaire. Among them, 171 professionals accepted the questionnaire but didn't return them. Among the people who were returned the questionnaire (1134), we found 51 to be ineligible based on not fitting into the inclusion criteria (duration less than one year; 25 in IT sector and 26 in ITES sector). Among the eligible subjects (1071), we conducted the study regarding Job stress and Hypertension among 599 IT professionals and 472 ITES professionals. There were 12 subjects with missing data on inclusion criteria who were excluded from analysis.

Data Collection

The variables collected were guided by the three hypotheses mentioned in chapter.1.

Hypothesis.1: There is a higher prevalence of job stressors and hypertension in IT/ITES professionals.

Hypothesis.2: There is a higher prevalence of job stressors and quality of life in IT/ITES professionals.

Hypothesis.3: There is association between job stressors and specific sexual behaviors among IT/ITES professionals.

A questionnaire that contained variables for all these hypotheses was administered to the study population. [The details of specific measures of variables and relevant statistical analyses are provided in the respective papers in the results section]. This chapter will detail the generic properties of the variables of interest.

We recruited qualified professionals, with earlier work experience in other risk behavior related studies, as supervisors and facilitators. Facilitators had the principle task of contacting eligible subjects and bringing to them to the research desk. They were teamed up with a medically qualified professional to facilitate efficient measurement of blood pressure to be taken and to build rapport and trust with the subjects. Training sessions for all field personnel were organized specifically for this study before the start of the study. All field personnel were adequately remunerated. The professionals received structured training in the methodology of field-based health and cardiovascular surveys by the principal investigator. There was constant presence of the researcher at all interview sites to ensure informed consent was administered, to clarify any doubts of the participants and to enable privacy and confidentiality of the responses. Research staff answered most of the questions, if the subjects needed any (based on initial trainings). Based on the need, the researcher either informed volunteers to return at another time convenient to the subject or the subject was invited to a suitable place to complete the

questionnaire. All participants were instructed on the how to complete the questionnaire. Neither the interviewer nor researcher was present in the room, where participants completed the self-administered questionnaire, but were available to assist with any problems during the process.

The questionnaire was self-administered, after obtaining informed consent to participate. The questionnaire contained the following details: -

(i) Demographic and social characteristics such as age, marital status, profession, education and socioeconomic status;
(ii) Components from the Occupation Stress Index questionnaire to assess job stress;
(iii) Lifestyle-related factors such as dietary intake, physical activity, tobacco use, current and past socio economic status (SES), Education level and Alcohol intake.
(iv) Quality of Life: was assessed by using WHO-QoL (BREF). (24)
(v) Musculoskeletal symptoms: The Nordic musculoskeletal questionnaire was used
(vi) Sexual behaviour: Questions related to high-risk behavior, safe sex and routine sexual practices were used.

If the study subject complained of any problem, they received counseling for appropriate help measures and were advised for medical treatment or referred for a specialist treatment as required.

Data management

Pre-coding reduces error in data handling and storage. Data editing was done to compare datasets for consistency and logic checks. The results from the physical examination were linked to the data set. After data editing, the completed data sets were backed up and safely stored. The Primary investigator and key staff have a password-protected access to the saved data files.

Measures

Exposure of interest:

Job stress was the principal exposure of interest. Job stress was calculated by combining different combinations of the job stressors used in the study. "Job Stressors" are defined as "working conditions that may lead to Acute Reactions, or strains in the worker." We considered three validated questionnaires for the measurement of Job stress in the proposed study. They were:- (1.) Job Control Questionnaire (JCQ) questionnaire used in phases 5 and 7 of the Whitehall study in UK,(25) Occupational Stress Index (OSI) questionnaire (26) (27) used in specific occupational groups and Generic Job Stress questionnaire from NIOSH, CDC.(28) We chose the Occupational Stress Index (OSI) with permission from Karen Belkic. It is without copyright protection and includes permission in terms of flexibility to modify the questions. The questionnaire collected the information to cover the job stressors, buffer factors, non-work activities and acute physiologic responses as suggested by the theoretical model described in the development of Occupational Stress Index (OSI). (26, 28-38) OSI is an additive burden model that focuses on work stressors relevant to the cardiovascular system(39). This index integrates well known domains from the Job Strain Model (40) with an attempt to capture stress at work, however, it differs from the Job Strain model (40) and the Effort-Reward Imbalance model as (41, 42) they are based heavily upon sociological theory, while OSI originates from cognitive ergonomics and brain research. (26, 28-38). There are two major types of self-reported questionnaires. The first type includes occupation specific questions while the second comprises generic questions. (43). The OSI is, a combination of these two methods. (26, 28-38) (43)

We recoded capacity of work, goal of exercise, break time, duration of current occupation, frequency of shift work done per month, number of nights after night shifts, working from home, upgrade options available, type of evaluation done by supervisors of the employees, type of

monitoring done, amount of light available in workstations, solving dilemmas at work and discrimination of work. Variables were recoded in increasing order of contextual stress. For example, breaks were recoded such that level 1 represented taking breaks regularly. This represented the least amount of stress in the recoded variable being level 1. Not taking breaks at all would constitute most severe stress and hence it was recoded as level 4. We also used contextual stress domains, calculated based on the results from qualitative study. The details of information for each domain are given in table.1.

The final step included calculation of tertiles for OSI and contextual stress domains. The cutoff points are provided in table.2. Three variables in our study, namely job stress, quality of life and musculoskeletal symptoms have no cut-off values for IT/ITES professionals or even for Indians in general. Hence, we used tertiles. This method has been employed in several earlier studies.(44-47) These tertiles of job stress (OSI and contextual stress domains), quality of life and musculoskeletal symptoms were created to explore the contrasts between the categories of job stress and detect threshold effects.(47) In this type of analysis, job stress categories are identified for subjects whose scores exceed the tertiles of the distribution of respective type of job stress. [22] According to this approach, individuals are assigned to the high stress category for shift work, if they score above the higher tertile (>57.15) of the distribution of shift work scores, moderate stress if the individual scores between >28.58<=57.15 and low stress if scores <=28.58. Due to the relatively small range, the tertile and the median cut points overlap occasionally. [22]

Outcomes of Interest:

We used definitions of the Seventh Report of the Joint National Committee (JNC-7) on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure to diagnose Hypertension.(48)

Pre-hypertension was defined when systolic BP fell within the range of 120–139 mmHg or diastolic BP falls within 80–89 mmHg in non-hypertensive subjects. *Stage I Hypertension* is when systolic blood pressure is greater than 140 and less than159 mmHg or diastolic BP >90-99 mmHg or history of treatment for hypertension or those who are antihypertensive therapy. *Stage II Hypertension* is defined as systolic blood pressure (SBP) greater than 160 mm Hg or diastolic BP greater than 100 mmHg. (49) (table-4)

Apart from using continuous variables of systolic blood pressure (SBP) and diastolic blood pressure (DBP) for analysis, four new variables of hypertension were created to reflect JNC-VII classification (four stages, with normal, prehypertension, stage 1 and 2) and binary classification (Hypertensives or normal). The criteria followed for classification are elucidated in Table.3.

Quality of Life (QoL) has been defined as "the extent to which one's usual or expected physical, emotional, and social well being is affected by a medical condition or its treatment" The WHOQOL is a generic, cross-cultural, subjective measure of QoL. (24) It contains 25 facets, each with four items, which are subsumed in six domains. We used WHOQOL-BREF facets to score qualify of life through summative scaling. Each item contributes equally to the facet score. Mean scores are then calculated. In this case, all the items in the respective facet are added and divided by four. Thus, each facet contributes equally to the domain score. Domain scores are calculated by computing the mean of the facet score within the domain, according to the following formulae. The facets are summated according to the procedure given below. Four multiplies the scores so that domain scores range between 4 and 20. A detailed description of this measure is provided in the chapter.5.

The WHOQOL six domain scores denote an individual's perception of quality of life in the following domains: Physical, Psychological, Level of Independence, Social Relationships,

Environment, and Spirituality. Individual items are rated on a 5 point Likert scale where 1 indicates low, negative perceptions and 5 indicates high, positive perceptions. As an example, an item in the positive feeling facet asks “How much do you enjoy life?” and the available responses are 1 (not at all), 2 (a little) 3 (a moderate amount), 4 (very much) and 5 (an extreme amount). As such, domain and facet scores are scaled in a positive direction where higher scores denote higher quality of life. Some facets (Pain and Discomfort, Negative Feelings, Dependence on Medication, Death and Dying) are not scaled in a positive direction, but in reverse direction. We calculated quality of life using SPSS syntax file, which we obtained from the WHOQOL SRPB Coordinator, Mental Health: Evidence and Research, Department of Mental Health and Substance Dependence, CH-1211 Geneva 27, Switzerland. The WHO-QoL,(24) a generic measure of health-related quality of life which was used to assess health status of workers according to job titles held by them.

We calculated tertiles for quality of life across their respective gradations.

We added questions from the Standardized Nordic questionnaire(50) to obtain information on repetitive tasks and work conditions, which can cause musculoskeletal symptoms. We used specific questions to elicit pain, discomfort from posture, repetitive movements and strain involving shoulder, arm, neck, fingers, wrist, upper back, lower back, and leg.

We used specific questions to elicit pain, discomfort involved with shoulder, arm, fingers, wrist, upper back, lower back, leg and headaches.(50) This standardized questionnaire contained items identifying areas of the body causing musculoskeletal problems. Respondents were asked if they have had any musculoskeletal trouble in the last 12 months and last 7 days, which prevented normal activity. This questionnaire has been validated in several countries including India and the studies have concluded that this was reliable as a screening tool. (51-53)

Recoding of the existing information was done to denote the severity of chronic musculoskeletal symptoms of head, eye, neck, shoulder, elbow, wrist, upper and lower back, hip, knee and ankle. Similarly, acute musculoskeletal symptoms were recoded to reflect acute musculoskeletal symptoms for all these parts. We also calculated composite chronic musculoskeletal score that combines chronic musculoskeletal symptoms for all the parts mentioned above and a composite acute score that combines acute musculoskeletal symptoms for all parts.

As an example, we illustrate recoding of chronic score for one component, namely head. The questionnaire contained three questions regarding symptoms related to head. The *first question* sought whether the worker at any time during the last 12 months had trouble (such as ache, pain, discomfort, numbness) in head. *The second* question inquired whether during the past 12 months, have you been prevented from carrying out normal activities (housework, hobbies, work) because of this trouble. The third question sought whether during the past 12 months, have you seen a physician for this condition. If the answer to all three questions on headache was yes, then it will be recoded as level 5, reflecting severity. If there was as ache, pain, discomfort, numbness and the person had to see a doctor for it, (yes to 1 and 3 but no to 2), then it is coded as 4. If answer to first two questions is yes and third is no, then it is coded as 3. If the answer to first question is yes and no to next two questions, then it is coded as 2. The code 1 is given who said no to all three questions.

Finally chronic and acute musculoskeletal scores were calculated by combining the scores of all the parts to a total combined score of 100. The formula is as given below:

Chronic musculoskeletal score = (Sum of chronic score for all eleven parts/11)* 20

Similarly, Acute musculoskeletal score = (Sum of acute score for all eleven parts/11)* 20

We calculated tertiles for musculoskeletal symptoms such that increased musculoskeletal symptom was reflected across their respective gradations. The tertiles for chronic musculoskeletal score was calculated by having good score as <=20, moderate as >20=<29.1 and poor score >29.1. The tertiles of OSI were made by using the following criteria low as <=49, moderate as >49=<61 and high for OSI>61. (Table.2)

We sought information on variables that might be associated with exposure and outcome variables under each of the hypotheses. We collected information on dietary intake, physical activity, tobacco use (ever and current), socio economic status (SES), alcohol intake, shift work, leg length(54) and other socio-demographics. A brief summary of variables and details on measurement of these is presented in table-2.

Dietary assessment was done using a semi-quantitative food frequency questionnaire and involved recall of food items during the 24 hours preceding interview. The validity of such food frequency methodology has been established by a large number of large-scale epidemiological studies.(55) Indian National Nutrition Monitoring Bureau has used this method for several studies.(56, 57) We used detailed nutrient values for Indian foods from several studies, which has been well combined in several studies based in India **(58-61).** The earlier studies were conducted in South India. The average daily nutrient intake for each listed food item was computed by multiplying the reported frequency with serving size and per-portion nutrient composition. Similarly, nutrients derived for all the foods were summed to obtain an average total nutrient intake per day for each individual, and these data exported to the statistical software for further analyses. (Table.4)

The 24 hour Dietary Recall of the subjects was not appropriate and did not disclose the exact menu plan consumed at the time of recall. To overcome this bias standard Menu plan for

Plate Meals, Full Meals and Dinner etc. were developed based on their caterers General Menu served at their Cafeteria. Approximate quantities served by the caterer were taken into account and nutritive values have been calculated. In the formula, the calorie dense items were given their respective calories based on the quantity presumed from the caterer's serving size and the total calories consumed per day has been calculated. The calorie values used for calculating Nutritive values were calculated mostly from the Table of Food exchange system as per recommended Nutritive Value of Indian Foods from National Institute of Nutrition. (Tables 5 & 6)

Physical activity levels were assessed using a validated physical activity questions specific for the Indian population that focused on whether the professionals did regular exercises defined as exercises for at least 20 mins per day for at least 5 days in a week. There were other detailed questions on aerobic exercises, goals of exercises and leisure-time exercises. The information was derived from self-reporting. (62) Studies done in India earlier used questions about occupation, leisure time activity and household work, and related those to outcomes of interest.(63, 64)

Tobacco use was defined as consumption of any form of tobacco in the past 6 months. The types of tobacco consumption included smoked (cigarettes, beedis and cigars), oral (tobacco chewed, pan masala, etc.) and inhaled forms (snuff)

Earlier, a scale was developed by Tiwari et al (65) to measure SES of urban and rural communities in India, which has been standardized and found effective in the contemporary Indian settings. The original scale contained seven profiles including house profile, material possession profile, education profile, occupational profile, per capita income of family and two profiles of social status (social understanding and social participation). We developed a modified

profile based on the Tiwari scale to suit the scale for metropolitan areas. Our scale contained five profiles and was field-tested during the pilot study.

The first profile covered whether one owns a house in Bengaluru or not. The land value of Bengaluru is one of the highest in the country and would thus differentiate between people who are in upper strata and therefore could afford to buy house in Bengaluru and those who are in lower strata of affordability. Unlike Tiwari scale, we didn't consider to score house profile based on land area and house type. The reason is that, the cost of house is calculated in Bengaluru and other metropolitan areas is based on only the land value (in square feet or square meters) and not on the value of building. The type of building, roof and floorings do not add incremental value to the site value.

The second profile material possession profile addressed whether the person owned a car and how did they travelled to the office from their residence. Tiwari scale considered materials positions in terms of two sub parts-household gadgets and conveyance facility. They also provided alternatives in household gadgets based on the quantity and total cost of the gadgets. We found through contextual information and evidence that the household gadgets such as television, other electronic items are not differentially distributed across different layers of middle class. Therefore, we considered only travel mode and possession of car to differentiate the distribution in terms of economic status. We tried to estimate this profile through possession of car, whether they could afford to keep a driver on salary, self driven-two wheeler and public transport. Car-pooling had the same weightage as self-driven car. (7)

The third profile was defined according to the highest educational status achieved by the subject. Weighted scores for achieved educational status were given, *e.g.*, '1' for 12 years of formal education and 5 for higher studies (Ph.D.).

The fourth profile was occupational profile. The questions in this profile were assimilated based on the attributes of the occupation of the respondent. This profile had details regarding the current job title, total number of years worked in current occupation and total duration of work. Weighted scores for achieved occupational status were given, '0' for less than 1 year to 5 for senior levels of work.

In the fifth profile, the classification was done according to the job-security of the respondent including income. The classification included how much the respondent earned per month after taxes, the attributes of pay in covering basic needs of respondent and family, whether there are possibilities to upgrade their job title/advance their career and whether they received support and encouragement to advance their career.

Scoring in the SES scale: All the five profiles were equally weighted, each having a maximum score of 10. Scoring on the second, fourth and fifth profile was weighted by averaging the subcomponents thereby making the final maximum score for each profile was 2. First and third profiles gave the respective profile directly as there are no sub-components involved in it.

Alcohol intake: The first question assessed whether they drink alcohol or not. If the answer to this question was yes, they had to answer regarding the frequency of drinking. The options for frequency of alcohol user were daily, weekly once, weekly twice, monthly once or occasionally.
Shift work: We obtained information on a variety of shift patterns including three-shift continuous, "forward rotation" with one week on and one week off, three-shift non-continuous (5 days a week, 42-hour shift rotation with weekends off) and seven-day double-day shifts (mornings and afternoons).

Data Analysis

The data from the cross sectional survey was analyzed using SAS 9.1.3104(66). We followed the following data layout for planning statistical analysis for all the papers.

Table. 8: Data layout for cross sectional study

Disease	Exposed-High	Exposed-Low	Total
Present	a	b	M_1
Absent	c	d	M_0
Total	N_1	N_0	T

Prevalence's of Hypertension/poor quality of life/sexual behaviour among those with high stress were given by $P_1=a/N_1$ and low-exposed is given by $P_0=b/N_0$. Measures of association can be estimated assuming steady state kinetics, in which disease duration and incidence rate are constant. (67) The crude prevalence odds of hypertension is equal to the incidence rate (I) times average disease duration (D):

$$P/(1-P)=ID \text{ --------- } (1)$$

The prevalence odds in equation 1 is the basic outcome measure in the cross sectional study. We can use the equation 1 to calculate prevalence Odds ratio as follows.

$$PO= [(P_1/ 1-P_1)/ (P_0/ 1-P_0)] \text{ --------- } (2)$$

Restating the equation 2, we will have $PO_1=I_1D_1$ and $PO_0=I_0D_0$, where I is crude incidence rate times the average duration D , 1 and 0 refer to highly exposed and low exposed workers. Alternatively, we can calculate prevalence ratio (17) as

$$POR=PO_1/PO_0=I_1/ I_{0=}IR \text{ --------- } (3)$$

Thompson et al have demonstrated that POR and PR will give quantitatively similar results when the prevalence's are low (<10%).(68) But in our study, where we expect as a priori that prevalence is high (18-31%) we expect that POR will give considerably larger relative risk. Hence, it is more straightforward to calculate PR in our study.

If the average duration of hypertension is the same regardless of exposure, that is if $D_1 = D_0$, the crude prevalence ratio will equal the crude incidence ratio IR[90]

$$POR = PO_1/PO_0 = I_1/I_0 = IR \quad \text{---------(4)}$$

C. Summary measures of Association

We will calculate a single summary prevalence ratio and single summary prevalence difference across strata of confounders.

The Mantel-Haenszel estimate of the summary prevalence ratio (SPR) is given by

$$SPR_{MH} = [\Sigma a_i N_{0i} / T_i] / [\Sigma b_i N_{1i} / T_i] \quad \text{---------(5)}$$

Confidence intervals for the SPR_{MH} is given by computing the variance of natural logarithm of SPR_{MH} ($\ln[SPR_{MH}]$) and exponentiating.

$$Var\,[\ln(SPR_{MH})] = [\Sigma M_i N_{1i} N_{0i} - a_i b_i T_i / T_i^2] / [(\Sigma a_i N_{0i} N_{0i} / T_i)(\Sigma a_i N_{0i} N_{0i} / T_i)] \quad \text{---------(6)}$$

And confidence intervals are given by,

$$SPR_{MH(23)},\ SPR_{MH(UL)} = \exp\{\ln(SPR_{MH} \pm Var[\ln(SPR_{MH})]\} \quad \text{---------(7)}$$

A summary measure can be obtained by computing the weighted average of the ratios, where the weights are the inverses of the variances of the stratum-specific prevalence ratios. An approximation of the variance of a prevalence difference is given as below [90]

$$Var\ (PD_i) = [a_i c_i/(N_{1i})^3] / [b_i d_i/(N_{oi})^3] \text{ ---------(8)}$$

The summary prevalence difference (SPD) is the given by (68)

$$SPD = \Sigma W_i PD_i / \Sigma W_i \text{ ---------(9)}$$

We looked at the variables associated with presence of risk factors. Crude and adjusted prevalence odds ratios (8), p-value and 95% confidence interval were calculated to evaluate possible association between covariate and outcome variables.

D. Univariate and Ordinal regression analysis

In order to control for potential confounding of the association between covariates and Hypertension, we examined a large number of variables simultaneously. For this purpose, we used multivariate regression analysis. Eg, in paper.4, the primary outcome variable was Hypertension. The outcome variable(s) being categorical (positive or negative), a logistic model is suitable. Variable selection was based primarily on prior knowledge and also the outcome of crude analysis. Variables with p-value > 0.20 in the univariate analysis were included in the multivariate analysis. Possible interactions were explored by including product terms in the model.

The basic regression model was of the following form:

$$Y=b_0 + b_1X_1 + b_2X_2 + \ldots\ldots\ldots + b_kX_k + e \text{ ---- (5)}$$

Where Y represents Hypertension, X_i are exposure and confounding variables, b_i are their coefficients, and 'e' is the random error term. b_0 is an intercept term that is the average value of hypertension for the entire group that would be detected if none of the exposure variables or confounder variables had any effect. The coefficients indicate the amount of change in the

hypertension per unit change in change of the job stress or confounder. We made conscious efforts to detect collinearity, which occurs when certain predictors are highly correlated with each other. (69)

SAS will automatically exclude subjects with missing values from the regression analysis. This will reduce the effective sample size. Strategies used to handle missing values in regression analysis will depend on the type of missing data. If the data is missing completely at random (MCAR) i.e., the missing cases are independent of the outcome and other covariates; or missing at random (25) i.e., independent of outcome but related to other covariates then we will use the method of multiple imputation to replace the missing values. However, we may use only the subjects with complete data if the number of missing values is very small and seems to be MCAR. In case of nonrandom missing data, we explored the patterns and reasons for the same. Such missing values cannot be simply handled by statistical means. (70)

We used ordinal logistic regression for all our estimates. All of our outcomes variables (Y) are ordinal, as we have calculated the categories ordered in a natural way such as Quality of Life (QoL) is ordered as Poor, Moderate and Good. One of the options we could have used is polytomous logistic regression model. However, this model does not make use of the information about the ordering. Hence, alternatively, to take account of the ordering obtained from contextual stress domains and data management, we used cumulative probabilities (interrelated to cumulative odds and cumulative logits) model.(12) (11)

For (k+l) ordered categories, these quantities are defined as follows

$$P(Y \leq i) = p_1 + p_2 + \ldots\ldots + p_i$$

$$odds(Y \leq i = i) = [(P(Y \leq i) / (1 - P(Y \leq i)] = [(p_1 + p_2 + \ldots\ldots + p_i)/(p_{i+1} + \ldots + p_{k+1})]$$

$$logit\ (Y \leq i=i) = ln[(P(Y \leq i) / (1- P(Y \leq i)], i=1,\ldots,k$$

The cumulative logistic model for outcomes arranged in ordinal categories is given by

$$Logit\ (Y \leq i=i) = a, + p_i X. + \ldots + p_{im} X_m,\ i=I,\ldots,k$$

The model is similar to the polytomous logistic regression model except that we have k model equations and one logistic coefficient b_{ij}, for each category/covariate combination. The general cumulative logistic regression model therefore contains a large number of parameters. A more parsimonious model can be thought of when the logistic coefficients do not depend on *i* and we have only one common parameter b_{ij} for each covariate. Based on this, the cumulative odds are given by

$$Odds\ (Y \leq i=i) = exp(a,)\ exp(b_i X_i + \ldots + b_m X_m)\ ,\ i=I,\ldots,k$$

This model suggests that the k odds for each cut-off category i differ only with regard to the intercepts a_i. McCullagh coined the term “proportional odds model” (12) as the above model suggests that the odds are proportional. The relatively stringent proportional odds assumption may be especially valid in cases where the ordinal response Y is related to an underlying latent continuous variable.

Ethical considerations

The study was anonymous, and no names or other personal identifying information were collected from the participants. Each participant was assigned a unique number and identified only by this number during the process. Quiet private rooms provided by IT/ITES companies were used for collection of information for both qualitative and quantitative studies. At the beginning of the survey, the interviewer/study coordinator briefly introduced him/herself and the study, then went through with the participant a series of formalities including the importance and

nature of confidentiality, issues related to the collection of information, rights not to participate and to withdraw from participation without penalty, incentive distribution, referral information related to health issues and access to the final report. Participants were not asked to sign the informed consent form but to indicate by ticking by study facilitator to maintain the anonymity of this study. Participants were given 500 Indian rupees ($10 U.S.) as compensation for their time. Both phases of the study were reviewed and approved by the UCLA Institutional Review Board (IRB, # G09-12-002-01, IRB#10-001348) and the ethics committee of The Public Health Foundation of India. (TRC-IEC 40/10)

Table.1: Components of Contextual Stress Domains

Duration of work	(Sum of responses to questions on job title, duration of work in current job and total years in current occupation.) Multiplied by 10
Working time	(Sum of responses to questions on days of work per week, number of hours or work, stress due to travel to and from office, work from Home even after working at work-place and whether take breaks during workday) Multiplied by 100/19;
Shift work	(Sum of responses to questions on work in shifts, nature and frequency of shift-work and free days available after shift work) Multiplied by 50/7;
Job Control	(Sum of responses to questions on length of breaks, permission to work from home, deadlines for work, control over speed of work, clear instructions given or not and monotony of work) Multiplied by 25/6
Income	(Sum of responses to questions on Pay proportionate to the work, sufficiency of salary and available options for advancing career.) Multiplied by 25/3;
Autonomy	(Sum of responses to questions on whether self or other person controls deciding work schedule, evaluation of work and nature of monitoring done) Multiplied by 100/9;
Appreciation of work	(Sum of responses to questions on recognition of good work and credit given for the work) Multiplied by 25/2;
Physical environment	(Sum of responses to questions on ergonomic seating arrangements, body position and activity during work, ventilation in work area, lighting and keyboard placed comfortably) Multiplied by 25/3;
Work-environment	(Sum of responses to questions on structured way and its efficiency of handling difficult situations or dilemmas, knowledge to perform work and comparisons to other workers) Multiplied by 25/6;
Affect	(Sum of responses to questions on abuses of power, blaming for someone else's mistakes, transparency at work-place, involvement in escalations from problems at work, abusive communication and discrimination) Multiplied by 50/9;

Table.2: Tertiles for stress domains

	Contextual Stress domain									
	Levels	Working hours	Duration of work	Shift work	Job control	Autonomy	Appreciation of work	Physical environment	Work environment	Affect
Values for defining tertiles	Low	<=63.16	<=70	<=28.58	<=54.17	<=66.68	<=37.5	<=50	<=45.84	<=38.89
	Moderate	>63.16 =<73.69	>70=<80	>28.58 <=57.15	>54.17 =<70.84	>66.68 =<88.89	>37.5 =<62.5	>50 =<58.34	>45.84 =<58.34	>38.89 =<55.56
	High	>73.69	>80	>57.15	>70.84	>88.89	>62.5	>58.34	>58.34	>55.56

Table.3: Diagnoses of Hypertension, 7th report of JNC on classification. [86]

Blood Pressure classification	Systolic Blood Pressure (SBP) in mm HG	Diastolic Blood Pressure (DBP) in mm Hg
Normal	<120	and <80
Prehypertension	120-139	Or 80-89
Stage 1 Hypertension	140-159	Or 90-99
Stage 2 Hypertension	> or =160	> or =100

Table.4: Tertiles for Quality of Life domains

	Domain	Levels	Values for defining tertiles
1	Physical QoL	High	<=12.8
		Moderate	>12.8=<15.2
		Poor	>15.2
2	Psychological QoL	High	<=12
		Moderate	>12=<14.7
		Poor	>14.7
3	Environmental QoL	High	<=12
		Moderate	>12=<15.5
		Poor	>15.5
4	Social QoL	High	<=9
		Moderate	>9=<12
		Poor	>12

Table.5: Description of nutrients in Indian food groups.

Five Food Group System	
Food Group	**Main Nutrients**
Cereals grains and products	
Rice, wheat, ragi, bajra, maize, jowar barley, rice flakes, wheat flour	Energy, protein, invisible fat, vitamin B1, Vitamin B2, Folic Acid, Iron, Fiber
Pulses and legumes	
Bengal gram, Black gram, Green gram, Red gram, Lentil (Whole as well as dhal), Cowpea, Peas, Rajmah, Soya beans, Beans Etc.	Energy, Protein, invisible fat, vitamin B1, Vitamin B2, Folic Acid, Calcium, Iron, Fiber
Milk And Meat Products	
Milk Milk, Curd, Skimmed Milk, Cheese	Protein, Fat, Vitamin B2, Calcium
Meat Chicken, Liver, Fish, Egg, Meat	Protein, Fat, Vitamin B2
Fruits and Vegetables	
Fruits Mango, Guava, Tomato, Ripe, Papaya, Orange, Sweet Lime, Water Lemon	Carotenoids, Vitamin C, Fiber
A. Vegetables (Green Leafy) Amaranth, Spinach, Gogu, Drumstick leaves, Coriander Leaves, Mustard Leaves, Fenugreek Leaves	Invisible Fats, Carotenoids, Vitamin B2, Folic acid, Calcium, Iron, Fiber
B. Other Vegetables Carrots, Brinjal, Ladies Fingers, Capsicum, Beans, Onion, Drumstick, Cauliflower	Carotenoids, Folic acid, Calcium, Fabre
Fats and Sugars	
Fats Butter, Ghee, Hydrogenated oils, Cooking Oils Like Ground Nut, Mustard, Coconut	Energy, Fat, Essential Fatty Acids
Sugars Sugar, Jaggery	Energy

Table.6: Food Exchange System by National Institute of Nutrition, India.

Sl No	Exchange List	Serving Size of Raw Wt. (g)	Carbohydrate (g)	Protein (g)	Fat (g)	Energy (Kcal)
1	Vegetable green leaf	1/2 Cup	6	Nil	*	30-40
	Others	1/2 Cup	6-10	Nil	Nil	50-60
2	Fruit	Varies	10	Nil	Nil	40
3	Cereal	25	19-21	2-3	*	85
4	Legumes & pulses	25	15	6	*	85
5	Milk &	1/2 Cup	4	3.5	4.0	65
	Meat	75	Nil	7.5	6.0	85
6	Fat &	10	Nil	Nil	10.0	90
	Sugars	10	10	Nil	Nil	40

Visible Fat, * Invisible Fat 1 Cup-200ml

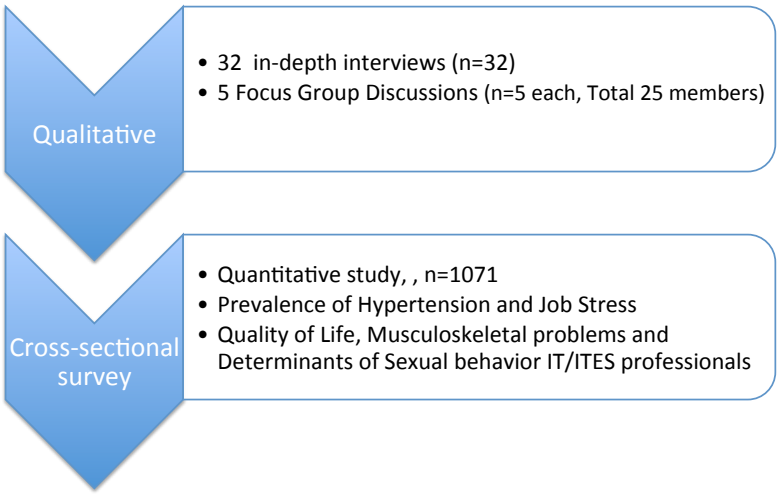

Figure.1: Phases in study methodology

Fig.1: Description of the Study Methodology- IT/ITES Survey, Bengaluru, India-2011

Table.7: Composition of SES matrix for IT/ITES professionals study, Bengaluru, 2010-11

Qn	Facet	Question	Codes	Score
1	**Land Possession**	Do you own a house?	1) Yes 2) No	0=No: 2=Yes
2	**Materials**	Do you own a car?	1) Yes 2) No	0=No:1.5=Yes
		How do you travel to Office from residence?	1) Company provided vehicle; 2) Self driven vehicle-car; 3) Self driven-two wheeler; 4) Car pooling; 5) Public Transport; 6) Own Car Driven by Driver 7) Others, please specify	0=1 or 5: 0.75=3 or 7: 1.5=2,4: 2=6
3	**Education**	Highest Educational qualification	1)PUC, Diploma & Pre-Degree 2) General Degree, BA, Bcom, BSc, BBA, BBM, BCA, BPT & BS 3) Professional Degree, B.Tech , BE & B Arch 4) Post Graduate, MCA, MBA, ME, Mtech, MA, Mphil, MFM & MHRM 5) Doctoral & PHD	0=1: 0.5=2 :1=3: 1.5=4 :2=5
4	**Occupation**	What is your current job title? (*Please be as precise as possible*)	1. Entry; 2. Junior; 3. Middle Management; 4.Senior Management	0=1: 1=2: 1.5=3 :2=4
		What is the total number of years that you have worked in your current occupation?	1. <11 Months; 2.12 to 23 Months; 3. 24 to 35 Months; 4. >36 Months	0 = <11 Months 1 = 12 to 23 Months 1.5 = 24 to 35 Months 2 = >36 Months
		How long altogether have you been employed (in any type of work)?	0 = <11 Months 1 = 12 to 23 Months 1.5 = 24 to 35 Months 2 = >36 Months	0 = <11 Months 1 = 12 to 23 Months 1.5 = 24 to 35 Months 2 = >36 Months
5	**Income**	How much do you earn per month after taxes?	INR_____	<10000 ---- 0 >10001 and <30000 ---- 1 '=>30001 and <50000 ---- 1.5 =>50001 per month ---- 2
		My pay is:	1) Based upon how much I myself work.	0=3,

			2) Based upon how much my group or collective, as a whole, works. 3) Fixed.	1.5=2 2=1
		My salary:	1) Covers substantially more than my basic needs and those of my family. 2) Covers a bit more than my basic needs and those of my family. 3) Just barely covers my basic needs and those of my family. 4) Totally inadequate to meet my basic needs and those of my family.	0=4 0.5=3 1=2 2=1
		Are there possibilities for you to upgrade your job title/advance your career?	1) Yes 2) No	0=No, 2=Yes
		If yes, do you receive support and encouragement to do so?	1) Definitely yes. 2) Yes, to some extent. 3) Not really, but there is no active opposition to such efforts. 4) No, there is active opposition to such efforts.	0=4 0.5=3 1=2 2=1

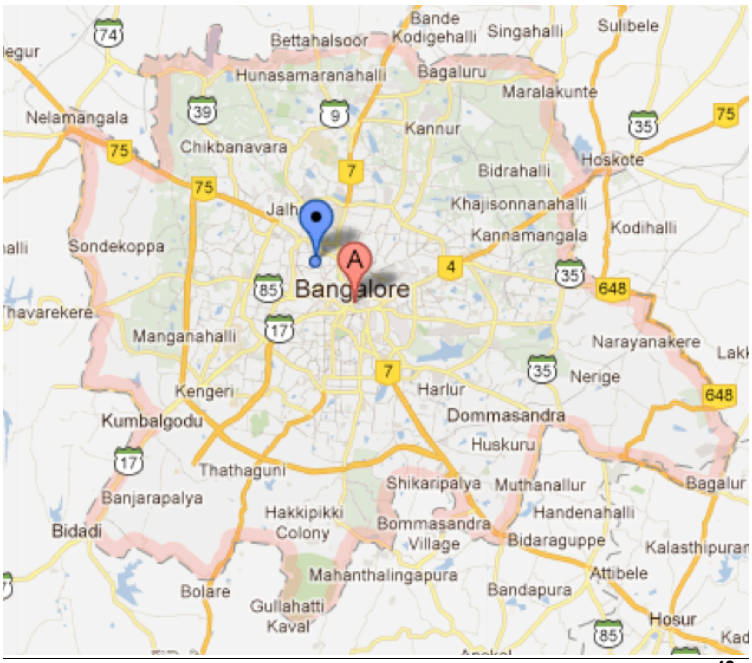

Fig.2: Map of Bangalore city and metropolitan area.[49]

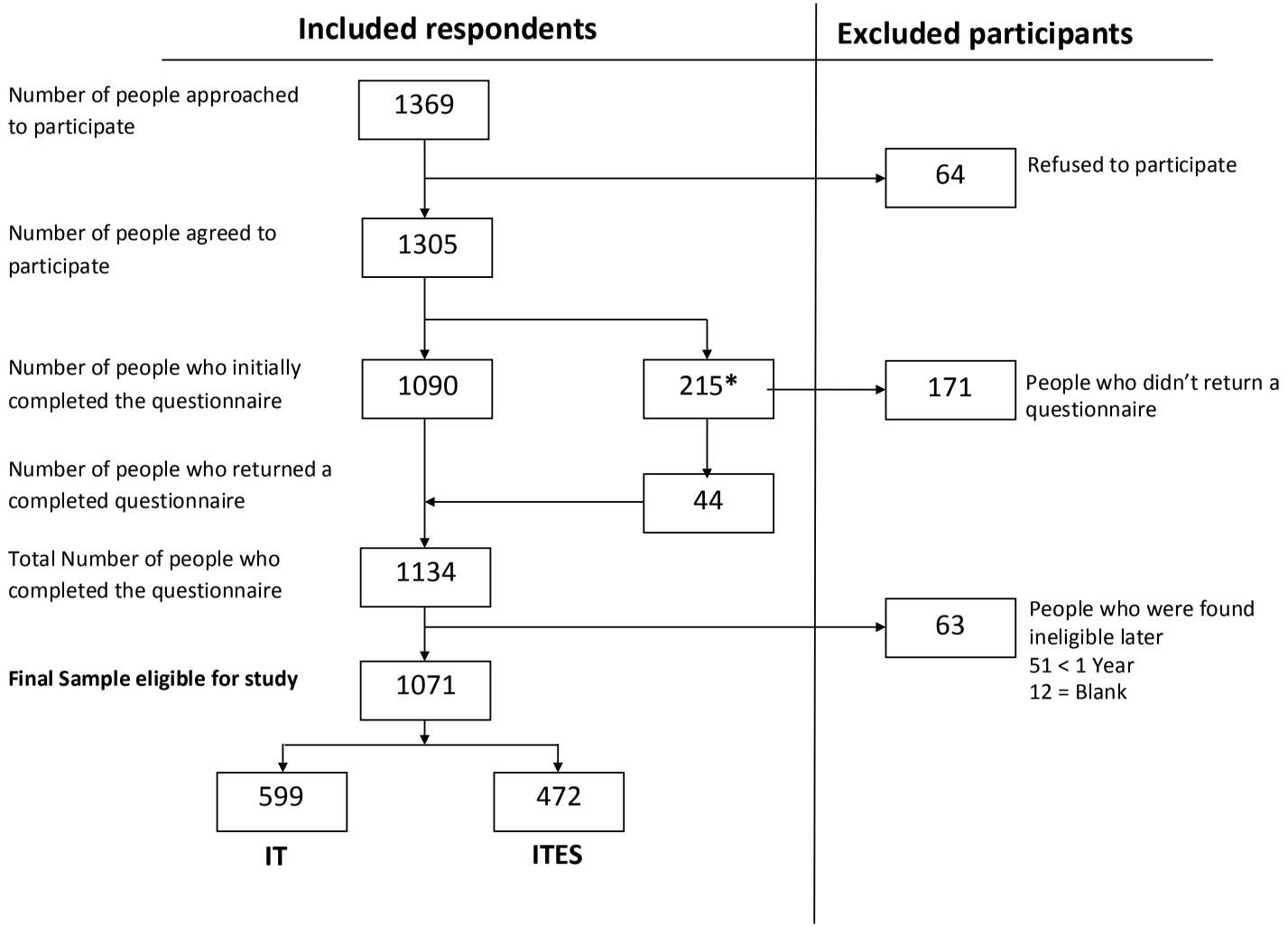

Figure.3: Diagram describing the flow of participants during the quantitative phase

References:

1. Inc I. List of software companies in Karnataka, India. 2010.
2. Mahesh. Software Companies in Karnataka. 2012; Available from: http://www.karnataka.com/industry/software/companies/.
3. Aarthi R T. 84.74 lakh and counting in Bangalore. Times of India. 2012 Mar 23, 2011.
4. Palike BBM. Zonal map of Bangalore. 2012; Available from: http://bbmp.gov.in/images/maps/BBMP Zones.jpg.
5. Palike BBM. About BBMP. 2012; Available from: http://bbmp.gov.in/.
6. Karnataka Go. document on Bangaloreit.biz. 2009; Available from: http://www.bmponline.org/eng-dept/sulaba-nakshe.shtml.
7. Rai S. Is the next Silicon Valley taking root in Bangalore? New York Times. 2006.
8. Ministry of Communications and Information Technology GoI. Annual report, Information Technology, 2007- 08.
9. National Association of Software and Service Companies N. The IT-BPO Sector in India : Strategic Review 20122012.
10. Muhr T. ATLAS. ti (Version 5.0)[Computer software]. Berlin, Germany: Scientific Software Development. 2004.
11. Altman DG. Statistics in medical journals: developments in the 1980s. Statistics in medicine. 1991;10(12):1897-913.
12. McCullagh P. Regression models for ordinal data. Journal of the royal statistical society Series B (Methodological). 1980:109-42.
13. Teddlie C, Yu F. Mixed methods sampling. Journal of Mixed Methods Research. 2007;1(1):77-100.
14. Giridhara R Babu RD. Chapter.2. Methods of IT/ITES study in Bengaluru, India [Papers]. Los Angeles: University of California Los Angeles; 2012.
15. Daniel WW. Biostatistics: Basic concepts and methodology for the health sciences: John Wiley & Sons; 2010.
16. Reddy KS. India Wakes Up to the Threat of Cardiovascular Diseases. Journal of the American College of Cardiology. 2007:j.jacc.2007.04.097.
17. Yusuf S, Hawken S, √îunpuu S, Dans T, Avezum A, Lanas F, et al. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. The Lancet. 2004;364(9438):937-52.
18. Gupta R. Burden of coronary heart disease in India. 2005.
19. Gupta R, Gupta VP, Sarna M, Bhatnagar S, Thanvi J, Sharma V, et al. Prevalence of coronary heart disease and risk factors in an urban Indian population: Jaipur Heart Watch-2. Indian heart journal. 2002;54(1):59-66.
20. Padmavati S. Epidemiology of Cardiovascular Disease in India: I. Rheumatic Heart Disease. Circulation. 1962;25(4):703-10.
21. Steyaert J, Gould N. Social Work and the Changing Face of the Digital Divide. British Journal of Social Work. 2009;39(4):740-53.
22. Deepa M, Farooq S, Datta M, Deepa R, Mohan V. Prevalence of metabolic syndrome using WHO, ATPIII and IDF definitions in Asian Indians: the Chennai Urban Rural Epidemiology Study (CURES-34). Diabetes/metabolism research and reviews. 2007;23(2):127-34.
23. Dean A, Sullivan K, Soe M. OpenEpi: open source epidemiologic statistics for public health, version 2.3. Update. 2009;20(05).
24. (WHO) WHO. WHOQOL: measuring quality of life: Division of Mental Health and Prevention of Substance Abuse, World Health Organization1997.
25. Chandola T, Marmot M, Siegrist J. Failed reciprocity in close social relationships and health: Findings from the Whitehall II study. Journal of psychosomatic research. 2007;63(4):403-11.

26. Belkic K, Savic C. The occupational stress index--An approach derived from cognitive ergonomics applicable to clinical practice. Scandinavian Journal of Work, Environment & Health. 2008;34(6):169.
27. Belkic K, Landsbergis P, Schnall P, Backer D, Theorell T, Siegrist J, et al. Psychosocial factors: review of the empirical data among men. Occupational medicine, State of the Art Reviews, The Workplace and Cardiovascular Disease. 2000;15(1).
28. Murphy LR. Job stress research at NIOSH: 1972–2002. 2002.
29. Belkic K. The occupational stress index: an approach derived from cognitive ergonomics and brain research for clinical practice: Cambridge International Science Pub.; 2003.
30. Emdad R, Belkić K, THEORELL T, Cizinsky S, SAVIĆ Č, OLSSON K. Work environment, neurophysiologic and psychophysiologic models among professional drivers with and without cardiovascular disease: Seeking an integrative neurocardiologic approach. Stress medicine. 1997;13(1):7-21.
31. Belkić K, Savić C, Djordjević M, Ugljesˇić M, Micković L. Event-related potentials in professional city drivers: Heightened sensitivity to cognitively relevant visual signals. Physiology & behavior. 1992;52(3):423-7.
32. Belkic K. Occupational Stress Index: An introduction. Scan J Work Environ Health. 2000:73-86.
33. Hannerz H, Albertsen K, Nielsen ML, Tüchsen F, Burr H. Occupational factors and 5-year weight change among men in a danish national cohort. Health Psychology. 2004;23(3):283.
34. Nedić O, Belkić K, Filipović D, Jocić N. Work stressors among physicians with and without the acquired cardiovascular disorders: Assessment using the Occupational Stress Index. Medicinski pregled. 2008;61(5-6):226-34.
35. Schnall P, Belkic K, Pickering T. Assessment of the cardiovascular system at the workplace. Occup Med. 2000;15(1):189-212.
36. Nedić O, Belkić K, Filipović D, Jocić N. Job stressors among female physicians: relation to having a clinical diagnosis of hypertension. International journal of occupational and environmental health. 2010;16(3):330-40.
37. Ugljesic M, Belkic K, Boskovic D, Boskovic S, Ilic M. Exercise testing of young, apparently healthy professional drivers. Scandinavian Journal of Work Environment and Health. 1996;22:211-5.
38. Belki K. Occupation-specific versus general self-report measures to assess psychosocial workplace exposures-dilemmas and potential solutions to bridge the gap. ARBETE OCH HALSA VETENSKAPLIG SKRIFTSERIE. 2001(10):258-60.
39. Emdad R, Belkic K, Theorell T, Cizinsky S. What prevents professional drivers from following physicians' cardiologic advice? Psychotherapy and psychosomatics. 1998;67(4-5):226-40.
40. Karasek Jr RA. Job demands, job decision latitude, and mental strain: Implications for job redesign. Administrative science quarterly. 1979:285-308.
41. Siegrist J. Adverse health effects of high-effort/low-reward conditions. Journal of occupational health psychology. 1996;1(1):27.
42. Siegrist J, Peter R, Georg W, Cremer P, Seidel D. Psychosocial and biobehavioral characteristics of hypertensive men with elevated atherogenic lipids. Atherosclerosis. 1991;86(2):211-8.
43. Landsbergis P, Theorell T, Schwartz J, Greiner B, Krause N. Measurement of psychosocial workplace exposure variables. Occupational medicine (Philadelphia, Pa). 2000;15(1):163.
44. Rugulies R, Krause N. Job strain, iso-strain, and the incidence of low back and neck injuries. A 7.5-year prospective study of San Francisco transit operators. Social science & medicine. 2005;61(1):27-39.

45. Cesana G, Ferrario M, Sega R, Milesi C, De Vito G, Mancia G, et al. Job strain and ambulatory blood pressure levels in a population-based employed sample of men from northern Italy. Scandinavian Journal of Work, Environment & Health. 1996;22(4):294-305.
46. Kahn HA, Medalie JH, Neufeld HN, Riss E, Goldbourt U. The incidence of hypertension and associated factors: the Israel ischemic heart disease study. American heart journal. 1972;84(2):171-82.
47. Boehm JK, Peterson C, Kivimaki M, Kubzansky LD. Heart health when life is satisfying: evidence from the Whitehall II cohort study. European heart journal. 2011;32(21):2672-7.
48. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL, et al. Seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure. Hypertension. 2003;42(6):1206-52.
49. India BW. List of BPO companies in Bangalore. 2012; Available from: http://www.bpowatchindia.com/outsourcing_company_list.html.
50. Kuorinka I, Jonsson B, Kilbom A, Vinterberg H, Biering-Sørensen F, Andersson G, et al. Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms. Applied ergonomics. 1987;18(3):233-7.
51. Dickinson C, Campion K, Foster A, Newman S, O'rourke A, Thomas P. Questionnaire development: an examination of the Nordic Musculoskeletal Questionnaire. Applied ergonomics. 1992;23(3):197-201.
52. Crawford JO. The Nordic musculoskeletal questionnaire. Occupational Medicine. 2007;57(4):300-1.
53. Palmer K, Smith G, Kellingray S, Cooper C. Repeatability and validity of an upper limb and neck discomfort questionnaire: the utility of the standardized Nordic questionnaire. Occupational Medicine. 1999;49(3):171-5.
54. Gunnell D. Commentary: Can adult anthropometry be used as a 'biomarker'for prenatal and childhood exposures? International Journal of Epidemiology. 2002;31(2):390-4.
55. Willett WC, Sampson L, Stampfer MJ, Rosner B, Bain C, Witschi J, et al. Reproducibility and validity of a semiquantitative food frequency questionnaire. American journal of epidemiology. 1985;122(1):51-65.
56. Thimmayamma B, Rao D. A comparative study of the oral questionnaire method with actual observation of the dietary intake of pre-school children. J Nutr Dietet. 1969;6:177-81.
57. Thimmayamma B. A handbook of schedules and guidelines in socio-economic and diet surveys. National Institute of Nutrition, Indian Council of Medical Research, Hyderabad. 1987;33.
58. Hebert JR, Gupta PC, Bhonsle RB, Murti P, Mehta H, Verghese F, et al. Development and testing of a quantitative food frequency questionnaire for use in Kerala, India. Public health nutrition. 1998;1(02):123-30.
59. Hebert JR, Gupta PC, Bhonsle RB, Sinor PN, Mehta H, Mehta FS. Development and testing of a quantitative food frequency questionnaire for use in Gujarat, India. Public health nutrition. 1999;2:39-50.
60. Gopalan C, Sastri BVR, Balasubramanian S. Nutritive value of Indian foods. Hyderabad, India:(National Institute of Nutrition). 1971.
61. Bharathi AV, Kurpad AV, Thomas T, Yusuf S, Saraswathi G, Vaz M. Development of food frequency questionnaires and a nutrient database for the Prospective Urban and Rural Epidemiological (PURE) pilot study in South India: methodological issues. Asia Pacific journal of clinical nutrition. 2008;17(1):178-85.
62. Sujatha T, Shatrugna V, Venkataramana Y, Begum N. Energy expenditure on household, childcare and occupational activities of women from urban poor households. British Journal of Nutrition. 2000;83(5):497-503.

63. Raman Kutty V, Balakrishnan K, Jayasree A, Thomas J. Prevalence of coronary heart disease in the rural population of Thiruvananthapuram district, Kerala, India. International journal of cardiology. 1993;39(1):59-70.
64. Gupta S, Malhotra K. Urban--rural trends in the epidemiology of coronary heart disease. The Journal Of The Association Of Physicians Of India. 1975;23(12):885-92.
65. Tiwari S, Kumar A. Development & standardization of a scale to measure socio-economic status in urban & rural communities in India. Indian Journal of Medical Research. 2005;122(4):309.
66. Institute S. SAS software: version 9.1. SAS Institute Cary, NC; 2002.
67. Rothman KJ, Greenland S, Lash TL. Modern epidemiology. Philadelphia: Lippincott Williams & Wilkins; 2008.
68. Thompson ML, Myers J, Kriebel D. Prevalence odds ratio or prevalence ratio in the analysis of cross sectional data: what is to be done? Occupational and Environmental Medicine. 1998;55(4):272-7.
69. Afifi AA, Clark V, May S. Computer-aided multivariate analysis: CRC Press; 2004.
70. Greenland S, Rothman KJ. Modern Epidemiology, 3rd edn. . Rothman KJ GS, Lash TL editor. Philadelphia: Lippincott Williams & Wilkins 2008.

Chapter.3. A Qualitative study about occupational stressors and the health of professionals in Information Technology in Bengaluru, India

Abstract

The Majority of the research on occupational stress and its relation to health effects stems from developed countries. Very few studies have been performed in developing countries such as India. This study was done to evaluate work conditions of professionals in two highly productive sectors of information technology (I.T) sector, also known as software development and Information Technology Enabled services (ITES), also known as call centers. The study employed qualitative methods in completing thirty-two in-depth interviews. The results indicate the presence of nine stress domains; job control, autonomy, time pressure, length of experience in industry, night shifts, income, appreciation of work, physical environment, work-environment and affective or emotional factors. These factors can initiate disease processes. We developed a conceptual framework based on the results from this study. This suggests that Global drivers of demand and local supply of skilled workforce and work force regulatory environment in India determine the work culture in Indian IT companies. These determinants influence workforce policies, priorities, goals and management practices. The work culture determines the health of both the organization and individual within the organization. Our study also finds that IT/ITES workers are happy about their wealth status and perceived quality of life.

Key words: Work culture; job stress; Information Technology (I.T); Information Technology Enabled Services (I.T.E.S);

Chapter.3. A Qualitative study about occupational stressors and the health of professionals in Information Technology in Bengaluru, India

Introduction

The increasing burden of cardiovascular diseases (CVD) is compromising the future of developing economies. Developing countries have the opportunity of learning from successful evidence based interventions in the United States (US), and other developed countries in reducing the prevalence of risk factors for CVD. Thus, there is also a great need to conduct research on factors, which accelerate CVD in working populations in developing countries.

India has a population of 1.1 billion persons comprising one sixth of the world's population and perhaps is home to the most CVDs in a single country anywhere in the world. The size of population, high prevalence of risk behaviors, sudden increase in a higher middles class with increased purchasing power and the dependence of the Indian economy on productivity of middle class underscore the need to study the Indian CVD epidemic among working professionals. The high burden of CVD in the developing countries is attributable to the increasing incidence of atherosclerotic diseases, perhaps due to urbanization and high risk factor levels, the relatively early age at which they manifest, the large sizes of the population, and the high proportion of individuals who are young adults or middle-aged in these countries. Workers in the Information Technology (I.T) industry are prone to almost all the recognized cardiovascular risk factors. ("Information technology" (I.T) or "IT-Enabled Services" sector.)

Information Technology (IT) is a broad discipline, which uses computer technology in managing and processing information, especially in large organizations. In particular, IT deals with the use of computers and computer software to convert, store, protect, process, transmit, and retrieve information. (1) Information technology enabled services is a form of outsourced service, which has emerged due to involvement of IT in various fields such as banking and finance, telecom,

insurance and others. Some of the examples of ITES are medical transcription, back-office accounting, insurance claims, credit card processing and others.

Several factors at work place elicit negative somatic and emotional reactions, evolving from poor balance between occupational load and the competencies, resources, and/or necessities of the worker. (2) These imbalances in individual traits and working environment determine the presence and levels of occupational stressors among workers. (3-7). Hitherto, several models and constructs have attempted explaining the interrelation between job stress and ill health. These are theory of allostatic load on illness by Caplan,(8) Hockey's construct of "resources," or total burden upon the human operator as an integrative model (9) the "Effort-Distress Model" of Folkow,(10) Job Content paradigms (JCQ)(11, 12), Demand-Control constructs (DCQ) (13), the Work Organization Matrix (WOM) for imputing job title averages of job characteristics to study subjects (14-17) and the effort-reward imbalance (ER1) model of work stress. (18)

Grounded on their relevance to local settings, these theoretical models become important for planning any intervention. However, there is very scarce evidence available from such theoretical models stemming from research in developing countries in occupational work forces such as in IT/ITES professionals. It is important to understand locally applicable, culturally relevant and contextual work related factors. This knowledge will help to explore the appropriateness relevant models in India and in applying through further studies or implementation of any interventions. We conducted a qualitative study to explore the presence of contextual work related factors and their determinants among I.T/I.T.E.S professionals.

Methods

Study site and participants The study was conducted between August 2010 and March 2011 in the city of Bengaluru. Bengaluru is the 27th largest city in the world and 3rd largest in India with a population of 6.8 million. (19) The Bruhat Bengaluru Mahanagara Palike (BBMP) is the fourth

largest Municipal Corporation in India. The Greater Bengaluru Metropolitan area spreads across 741 square kilometers. The city claims to be the IT Capital of India and often is called the “Silicon valley of India”. (20) During the year 2010, more than 1000 companies were listed as Information Technology (I.T) and Information Technology Enabling Services in Bengaluru, India. The city has more than 150,000 I.T/I.T.E.S professionals working in Information Technology and IT-Enabled Services. (21) Information Technology Enabled Services or "Remote Processing” is the next major driver of the technology services industry with inexpensive technology, well-industrialized set-up and availability of abundant graduate workers, who can speak English and are computer literate. (21)

The source population for the study comprised all I.T/I.T.E.S professionals aged 20-59 year olds working in “technical functions” in the I.T/I.T.E.S sector. Technical functions are characterized by involvement in human-computer interfaces within the IT and ITES industries. The inclusion criteria for participants in the study were: aged between 20-59 years, should have worked for at least 1 year in either IT or ITES industry and should fit the designation of “Technical worker” according to the Revised Indian National Classification of Occupations. (21)

The objective of the qualitative interview was to explore information on socio-demographic factors, individual experience as IT/ITES professionals, quality of work environment, Individual’s experience with stress, individual’s working and non-working environments, awareness about health and hypertension and perceptions and knowledge on "risks to health”. Thus, the interview guide was designed to capture both positive and negative factors at work place, which might have impact on overall wellbeing of the workers. The interview guide followed the definition of stress as “a state of mental or emotional strain or tension resulting from adverse or very demanding circumstances”(22) The interview guide listed the questions or which were to be used to ensure that the same basic lines of inquiry were pursued with each person interviewed. **(Appendix.1)**

Data collection

From July 2010 to March 2011, a qualitative study was conducted among IT/ITES professionals in Bengaluru, which included individual in-depth interviews and focus groups discussions (FGD). We conducted 32 in-depth interviews with I.T/ITES workers, recruited with the assistance of supervisors and H.R Managers (Human resources) in I.T and ITES organizations. Participants were recruited from workers holding different job titles, team leaders, and administrative staff of informal groups. Recruitment of volunteers was done through personal communication as well as with the help of HR managers.

The qualitative study was anonymous. We didn't collect any identifying information from participants such as name, email id, phone number or even name of company. At the outset, the interviewers emphasized the confidentiality and importance of the responses. Potential participants were informed that the study wanted to understand their work environment and how it affects them, and that this information was not available anywhere else. We administered "informed consent", and specifically requested permission to record the interview. Informed consent was obtained from all participants before conducting focus group discussions and in-depth interviews. All the interviews were conducted at a convenient time for professionals in a private room arranged by the investigators.

The interviews were semi-structured, open-ended and were conducted using an interview guide. The interviews were conducted in a flexible manner by allowing as much time as required by the participants to seek insights into each domain of the interview guide covering all the questions in the protocol systematically. All interviews were conducted in English. The whole conversation was audio-recorded. The interviewers also took notes on the contents of the interview, focusing on key phrases and main points made by the respondent.

The interviews started with greeting the participant and introducing the research staff and research objectives. The data collected was entered into an excel sheet and a set of codes were developed to classify the words by categories by using specific software tools ***deDoose*** (23) and ***ATLAS ti***. (24) After summarizing all the data, the shared information and opinions of the respondents that emerged from various cross sections of the people were summarized to make the conclusions.

Following a series of revisions, the conceptual framework for understanding the factors influencing stressors in IT/ITES professionals was finalized. (see Figure 1)

Results:

Demographic information

A total of 32 subjects were interviewed. (Table-1) The majority of the sample (50%) was 26-30 years of age, followed by 22% in 19-25 year age group. Around 60% of the sample was single, half were females, around half had professional or higher education and another 38% had a general degree. Employees from ITES comprised around 60% of the sample and the remaining 40% were IT employees. Around half the people in sample had worked for at least 2 years in the settings (but less than 7 years) while one fourth respectively were junior or senior to them in number of years of experience.

Theme One: Role of stressful domains

As IT/ITES professionals, respondents had to spend most of their time either in the office or attending work related calls or preparation at home in order to complete the stressful work schedule. There were several stress domains that were described by the professionals. Nine important domains emerged as common stressful factors across IT/ITES professionals. The

stress was perceived in a different manner based on the number of years spent in the same type of work. Hence, experience in industry was an important factor. Professionals in the ITES sector had to spend the maximum number of working hours in shiftwork. This was stressful as night shifts disturbed diurnal rhythm and affected other activities. Other stressful domains identified were poor job control, income related stress, autonomy, appreciation of work, physical environment, work-environment and affect (emotional factors). The list of stressful domains is presented in table. 2.

Time Pressure

The quantity of work IT/ITES professionals perform necessitates lengthier stretches of time in focused work in front of computers. From the results of qualitative studies, we found that there are several factors that are concerned with working time of IT/ITES professionals. We term them as "Time Pressure" and they include: duration of work on a daily basis, number of days worked per week, stress due to time taken to travel to office, whether they continue to work at home beyond office hours and whether one takes sufficient number of breaks during work. Nearly two thirds of the sample (64%) worked for more than eight hours a day on average and a nearly equal proportion (66%) worked for more than 40 hours per week. More than half (53%) worked on weekends.

"Somehow" is the key word in IT. Product timeline is fixed. Then everything is based on "somehow" to get it done. If you ask for the moon, the managers will just take it. If 31st July is the deadline given, we have to get it by 31st July. In US, where I worked, the timelines were realistic. In India, it is not the same. (32 years, IT professional, male, single)

" While I am doing one work, another work comes at the same time and this happens continuously. It's like one charger providing power to 4 cell phones at the same time. But the power and time is limited to get the things done." (23-year-old IT professional, single, male)

"I dislike the long meetings, long working hours. Being pushed for whatever which is not achievable". (40 years, IT professional, male, married with two children)

"Unnecessary meetings, wastage of time, no conclusion, more senior member of the meeting. My company is growing up and they say YES to anyone and anything. Unrealistic approach. They start working before even analyzing the requirement too". (28 years old in IT industry, male, married)

"Load of work within the stipulated timeline. When the work is dependent and my work is delayed because of other's slower pace of work and I am asked for the status, I will be stressed out. Fixed deadlines and targets, I feel little stress and mental pressure". (25 years single, female, ITES professional)

Length of Experience in industry

The duration of time spent in the working position and capacity for work influences whether one is stressed or not. We found that title of working designation, number of years in the current occupation and the total number of years at work play an important role in the way IT/ITES professionals feel and respond to stress.

"I can't look myself one day to be a CEO. I don't want to get stressed in the next five years down the line. Work definitely plays a role and if that continues for a longer period that result in you staying at office for more than 12 hours and people get stressed out." (40 years, IT professional, male, married with two children)

"Life before 4 years it was excellent after 22 years is not good. It is indirectly affecting your social life also. Initially I used to socialize but now we don't get some time to do this. - I don't know I would look like an old lady if the same thing continues." (25 years, female IT professional, single)

Shift work

Professionals mainly in ITES sector and to a much less extent in IT sector will have to perform shift work as part of their routine work. Our interviews found that there are several factors in shift work that influence one being stressed or not. They are whether there is shift work required as part of the work or not, number of night shifts one has to do and whether they get free days off as a result of shift work. In our study sample, nearly half (50%) of the sample wanted that free day as compensatory off be given after the night shifts. 16% of the professionals didn't like working in night shifts.

"Because of the job, I am not able to do things what I want to do. My routine life would be totally different because of the night shift. I don't find life so interesting as it was when earlier". (23 years analyst in ITES Company, female, single)

"Yes. They get some extra compensation for doing night shifts but it is really tough to manage the situation". (27 years ITES professional, female, single)

"I dislike shift times. When all my friends socialize I will be working. I am not able to give proper time to my family" (28 years old IT professional, male, single)

"Now I am working in general shift but before this, I used to work on shifts. We need to work on untimely basis. In a banking environment, we go for upgrade when nobody uses it". (28 years IT professional, male, single)

Job control

Our study found that there are particular issues identified by respondents, where job control had played an important role. Working from home is not generally allowed in Indian companies and workers feel that lack of permission for this causes a lot of other stressors such as traffic, not being able to balance between work and family etc. Correspondingly, workers who could decide whether they can work from home were found to be very happy and lack the stress caused due to several other factors. Correspondingly, executing work under strict deadlines, enforcing scrupulous speed of work, lack of clear instructions for accomplishing specific task/s and the repetitive nature of work caused professional to think that they do not have the control on the job. Nearly 10% workers inferred that they were being pushed against unrealistic expectations (11%) while an equal proportion complained of the monotonous work (11%).

"There was a new assignment, I was worried. Manager said "Its like swimming. Take them, throw them into water. They will learn it eventually." (29 years old, IT professional, male.)

I don't have much control on it and the process related work I have control in our job. In our company, we don't have holidays even on national holidays like 26th January 15th August, etc. (27 years ITES professional, female, single)

"Depends on the demands of the clients, we may not be able to have control. All depends upon the client requirements. It is all perception." (33 years ITES professional, male, married)

"Initially, I used to like it. But the work became monotonous. At times, it is little stressful because my profile is like that". (23 years analyst in ITES company, female, single)

Unnecessary burden of others onto you, which are not under control. Deadlines, targets, etc. brings in the point of stress. (39 years IT professional, male, married)

Income

Many of the interviewed professionals felt that income is a very important factor in sticking onto the current job and it is this that has given them an edge over other professions. Hence the lack of adequate salary operated as a worry for any given job. The adequacy of pay, the extent to which professionals can afford luxuries and necessities and presence of positive prospects were important factors affecting the stress status of individuals.

"I can be compensated more in the monetary terms". (32 years, ITES professional, female, married with 2 children)

"Initially I had so much of excitement. Now it is slowly reducing. We are working for the sake of money". (26 years, Software Engineer, female, single)

"We are here because Money is liked the most through economic security" (36 years, 11 years in IT, married and a daughter of 8 years)

"We are here only to earn money." (25 years, IT professional, female, single)

Autonomy:

Our results indicate that autonomy serves as an important factor in determining the stress propensity of professionals. In particular, the freedom to decide on schedules of work on their own, which was absent for most of the workers interviewed, is an important factor for job-stress. In addition, the way individuals endure evaluations, appraisals within their company and how they are supervised turn out to be important factors.

"I was trained in something and put in something else. Whatever I learnt that never came into use. After two years, I am getting offers on that. I am no more interested in that. Mainly we are losing interest because the things are not working out" (25 years, female IT professional, single)

"I am given the leverage to take care on my own. I don't have control on the timings. Deadlines will be fixed by me to my team members". (26 years, single, IT professional, male, married)

"I have lost myself" (26 years, ITES professional, female, single, On enquiring How do you feel about yourself)

"I can take my own decision and individuality by managing things. All other things got transformed. If I am not able to do this, then I am not the capable guy to do this and that is not the exact fact. Overall, continuously monitoring and no proper system of mentoring of whatever you do is the main drawback" (36 years, 11 years in IT, male, married)

"At our workplace, role clarity is missed which is disliked the most." (24 years, IT, male, single)

Appreciation of work

Some small acts of gratitude shown by supervisors ensured very good performance even when financial incentives were not given during the period of recession. Hence, dearth of appreciation can be an important deterrent in such pressure filled atmosphere. Additionally, some professionals articulated that some managers take away credit for work that truly belongs to them. This was felt as a very tough adverse element in enduring that job or with such supervisors in future.

"The clients appreciate our work and again it depends on the relationship between the clients and us besides, very difficult to get the management's appreciation". (24 years, 1 year in IT and single)

"Role clarity is missed which is disliked the most. Mentoring is also lacking. Partial appreciation to a very few groups of people leaving behind the remaining able personnel. Attitude is more important." (24 years, 1 year in IT and single)

"Being in IT, you earn well, you get recognized, happiness and satisfaction are positive attributes. Long duration of work, restricted to specific works, etc. are the negative attributes." (28 years IT professional, single)

"The clients appreciate our work and again it depends on the relationship between the clients and us besides, very difficult to get the management's appreciation." (24 years, IT, male, single)

"Encouraging is missed". (23-year-old IT professional, male, single)

Physical factors

Many workers expressed that physical infrastructure provided to them was very good and it was one of the positive reasons for going into IT sector. Some people complained about air conditioning of the place in that the regulation is done centrally and they cannot change the temperature that suits them. Overall, seating arrangements, amount of workspace available, ventilation and amount of light at work place were important.

"I feel like I am put in a cage. There was basically no exposure to the outside world. As if I am put in a box, with no hole to breath. I requested and got released from the environment." (25 years, female, systems engineer in IT industry)

"They can't change AC to your level because everyone is good at 25 degrees and it can't be changed. When it comes to chair, which is a personal comfort we can't expect unless you have the position and designation." (40 years old, IT professional, male, married with two children.)

"To be very honest Bengaluru doesn't require AC to a great extent but still AC is always ON creating discomfort to few employees." (25 years single female, ITES professional)

"Noise, lights, and people talking around we need to cope up with so many things in and around you." (29 years analyst in ITES professional, female, married)

Affect

There are several emotional factors that have importance in determining how IT/ITES professionals cope with stress. There are instances when mistreatments have occurred or senior managers have resorted to using abusive communication at work. In these instances, the cause of stress and coping mechanism are dependent on the way individual responds. Other factors that fall in this domain are professionals getting unnecessary blame for failures or impending failure, escalations involved in work and discrimination at work. Discrimination at work is an important factor to study in India. In a setting that is predominately occupied by upper castes, the reason for discrimination was found often on a regional basis.

"On face of many people, I have seen the stress in the most tensed situations". (23-year-old IT professional, male, single)

"He (Human Resources officer) humiliated me in front of many of my colleagues. He told me that the market is good and why don't you quit if you don't like the job given to you." (25 years, female IT professional, female, single)

"Its all superficial that they (employees) are there for each other. We don't have close bonding with anyone. You can't share any personal issues with your colleagues. Group dynamics exist due to which they are not too welcoming. Its some kind of stress - it's the uncomfortable situation. I don't know with whom to go out for lunch or coffee breaks." (28 years, ITES professional, female, married)

Theme Two: Role of buffer domains

Work environment

Dilemmas at work can be caused due to several factors such as lack of information, unrealistic expectations from senior managers. In such instances, the system of dilemma resolution and

providing help to solve the dilemmas play as an important role towards relieving stress. Transparency of work is an additional factor influencing the stress propensity of professionals. Further, comparing with others about work expectations and how each person performed are as negative influences. A good work atmosphere has better work environment and hence can be thought of a good buffer mechanism in relieving the job stress. A good system will also ensure transparent and fair practices without undue comparisons of individuals.

"The conflicts with my team members will not be directly about anything personal but related to the work. I will be getting pressure from the top. The pressure gets passed on to the team members." (26 years, single, male, IT professional)

"Even through deadlines are there always, not much pressure because of team support and control on job. Sometimes more responsibilities are on our shoulders, sometimes I need to go to work at different place and else it's manageable." (30 years, male, IT industry, single)

"Gender issues and politics are given first priority due to which the work environment gets polluted. During recession, one of my team members, a lady has been harassed by one of her team members; she reported that the cabs facility has not been properly arranged. This resulted in submission of forced resignation and the issue has cropped up due to her not interested in working late". (27 years, 2 years in IT, male, single)

"Too many working hours, conflicts within the team, discomfort or not having proper training. Not being properly guided and creating ambiguity". (25 years single, ITES professional, female, single)

"Setting targets themselves should be directly proportional to the ability of the person and introspection of the person. Lack of knowledge from various parts of the world; have to introspect what can I achieve and what is my target if they can put that as a target and try look at it as an achieving note, they can excel". (40 years, IT professional, male, married with two children)

Family

Apart from the work environment, the other most important buffer factor is the support received from family members. The respondents felt that it was very difficult to balance work and family life. Thus, IT/ITES professionals would feel less stressed if there was good support from the family members and vice versa.

"We are not their slaves because they are paying us. There was an instance when I came out of my first assignment. They were forcing us to go to different location. I requested them that my parents are staying with me and I can't go to Chennai. Initially they asked me to attend some interviews but later the HR manager did not consider my request. (25 years, female IT professional, female, single)

"Sometimes, when you are very much tied up with your work and you have to attend to your children, you will get stressed". (32 years, ITES professional, male, married)
"Being a married woman, I have to take care of my child, husband, in-laws and office. In this kind of situation, I delegate the work to my subordinates. At home my husband is very obedient and very cooperative". (27 year ITES professional, female, married)

"If my parents are not doing well or any other issues like health reasons, I will be disturbed". (23-year-old IT professional, female, single)

"If I am unable to work, after coming back from the office, I can't do household activities. I do get the support from my family. My mother's health is not good and hence, I have to take care of her and all my activities in the home. When compared to official life, personal life is far better". (26 years, ITES professional, female, single)

Theme Three: Role of Lifestyle factors

Some people admit that smoking helps them to relieve their stress. In the same way, alcohol also acts as buffer factor. Both these habits also help people to group together and discuss their work related problems. However, habits such as tobacco use puts people at higher risk for chronic diseases. Hence, the concentric group of smokers might feel that they are getting relieved of stress while putting themselves at higher risk for disease. In the current study, 72% of the professionals agreed that they were current smokers while 6 % didn't. On inquiring the proportion of smokers in IT/ITES industry, more than one third of participants approximated it around to be 25-50%, while one fifth of people thought it should be around 50-75%. Three individuals (9%) gave information voluntarily on smoking proportion in women professionals and approximated around 25-50%.

"BPO centers are like boon + bliss. Health part it has a negative impact. Traditional social life hardly exists any more. People are happy socializing". (28 years, ITES professional, male, married)

"I sneak out sometime for every 2-3 hours because I smoke and chat with colleagues". (27 years old IT professional, male, single)

"Breaks - breaks are not too often. Mostly a break for tea or accompanying my colleagues to smoke. Ratio of men to women who smoke - 2 years back - out of 10 about 3 - women and 7 - men now it is 50-50 ratio". (28 years IT professional, male, single)

Theme four: Knowledge and awareness regarding health

Around 60% rated quality of life to be moderate (4-7 out of 10) and approximately identical proportion (63%) regarded quality of health of IT/ITES professionals to be moderate as well. (4-7 out of 10)

Knowledge

"Whenever pulse rate goes up, it is high BP". (26 years, ITES professional, single, male)
"As of now, I am lucky that I am not having any of these diseases. But in the next 15 years we may have all the possible diseases because of this pressure, rise in your blood pressure. But I don't know how or what happens if it is there". (28 years, ITES professional, male, married)

"No way that anyone can get BP. In this industry, the crowd is very young." (26 years, single, male, IT professional)

"I know that hypertension in a very serious situation leads to death and I know where to seek treatment." (32 years, ITES professional, male, married)

Awareness about health in IT/ITES industry

"Message is to be given to the IT industry, you have to create awareness and also educate people about it. They are tensed about getting educated related to heart and body. People don't want to know what they can really do in saving lives." (40 years old, IT professional, male, married)

"Majority of the IT people lack the knowledge of the biological mechanisms of the body. If they can give some kind of session and talk about the various kinds of diseases for each and every company for a week of 1 or 2 hours can help them in getting the knowledge on this. Spread awareness by holding health camps." (28 years, IT professional, male, single)

"I think regular health check ups should be made mandatory unless they feel ill they won't go so we need to create awareness about the benefits of these health checks ups and motivate them to do the same. As long as like the companies do it for all its employees, that will be a good way. (26 years, single, IT professional)"

"Lot of education can be given to Indians who are able to get through mobiles. Why do we not adapt and educate the service providers to send the SMS to their subscribers once in fortnight regarding information on health. Get to an understanding, collect data and start sending the information, they start thinking in that direction and investigate about how you want to make money. Some of the innovative thoughts have not been put into health care domain in our country is lack of using technology in spreading awareness." (40 years, IT professional, male, married)

Theme five: Work culture and its determinants

"Money is liked in short time and interesting technical things could be learnt. Don't like to do clerical work being an engineer. Fierce competition leads to insecurity of job – alienation. Management has to ensure that the employees should be trained properly and timely. The whole IT business is trying to reduce the creative nature of the employees". (36 years, 11 years in IT, male, married)

"We have our festivals and US people don't have that and hence we wont get leave. When we get leave, we don't need it. The time when we come in, it is tough for our family to cook food for us leading us to go for junk food. If we get good food quality, it will be really great. We have comfort zones also. You don't have any social life outside". (28 years old IT professional, male, single)

"I am a bachelor I am out of my state, eating outside; my health got deteriorated due to obesity. Keep concentrating on the desktop monitor my vision is blurred. Normal life creates a problem when stress is more". (34 years old IT professional, male, single)

"My basic problem was travelling during pregnancy and the company provided a laptop and the facility to work from home". (27 year ITES professional, female, married)

"It is a very common saying, to get something good, you have to loose something. I am getting good experience and I am loosing my health, spending with my family and friends. I need to compromise on such things but health we need to take care of very much". (28 years old IT professional, female, single)

"Workload is very high as I am a bit aggressive and work hard too much which is not good for me but for seeking good position I need to do this. seeking a higher position and moving very fastly. Once you are in high position, the responsibility increases". (34 years old IT professional, male, unmarried.)

"Lot of things start with culture. What is it that they do. Its lot to do with culture. In India, always want the kids to get first in class. The stress starts from that age itself. Absolutely no encouragement for the kids to take up sports. In India, the food habits, the amount of oil that we use is too high". (*36 years, 11 years in IT, male, married)*

Management practices

Other major factors causing discomfort among employees were lack of transparency and lack of adequate salaries. Around 4% of professionals complained that job stress itself is one of the

antipathies workers have to face. Other dislikes of professionals were the distance and time to travel to office from home, prejudice demonstrated by managers, inefficiency of other workers which affects team work and lack of interaction. The factors that professionals don't like are meetings, lack of creativity, no scope for developing personal relationships, relying on outdated systems functioning, lack of adequate training required for performing work, lack of support from supervisors, using sarcastic sentences in daily communication and not providing free days after night shifts.

"Night shift, managers / supervisors are the main factors who pester us so much to get the work done. If your task is not completed within the deadline, it is again stressful. It is because of the deadlines also". (23 years analyst in ITES company, single, female)

"Factors in this which affects your work – individual himself, his sitting posture, chair, keyboards, keys, the monitor, etc.. Causes difficulty". (27 years old IT professional, single, male)

"When the data doesn't come correctly, we need to work on validation of the data which is not possible. due to stress, lack of sleep for these kind of issues". (23-year-old IT professional, single)

"Demands that is required for your job – attentive. My outputs should be very precise without deviation from them. It's not that no one is monitoring the timings but work demands me to be in the office for 9 hours a day". (28 years IT professional, single, male)

"I want to be on top. I don't care about others. I will suppress others progress and I come on top. I saw such kind of people in my current team, which irks me. I feel really bad and because I have not faced it personally. They shared their experiences with me. Once that impression comes, it is very difficult to change it. I tried to avoid them as far as possible. " (25 years, female IT professional, single)

"You don't know how to manage some work and the management is waiting for you to finish it and submit it. Training is lacking somewhere when the new joinees will be stressed". (27 years ITES professional, single, male)

"Basically most of the BPO offices are always located very far away and losing time in transit creating a disturbance in the work and personal life balance. If this is addressed it will be really helpful". (28 years ITES professional, single, male)

"11 – 12 hours we will be in office. No moving work only sitting and doing work. Mostly obesity is the problem faced and back pain, glasses used for head ache, etc. Other than lunch we will not be moving away from the computers. If we involve more to work, we may not be taking lunch in proper times". (23 year old IT professional, single, male)

Priorities and goals of companies

Sometimes, I have to manage my team members in their absence. Sometimes the stress is from the management's side, the deadlines and the projects to be finished. (27 year ITES professional, married with 1 child)

Conflicts – manager gets pressurized and the same will be carried on to us that kind of conflicts are available. (23-year-old IT professional, single)

Dependency which builds up where your performance is not only your's but its collective responsibility. (30 years IT professional)

Commonly, stress is caused by many factors: work pressure, boss is not good or peers are not good. Not so good environment, if the company policies are not good. If you are not performing well, you will be stressed.(28 years old IT professional, single)

We need to understand the activity whether we are capable of doing it or not. All are going in single path but we need to be taken to multiple paths. (23-year-old IT professional, single)

I don't like any issues that make me stay for longer duration in the office. (27 years IT professional, married)

Workforce policies within companies

"Due to lack of knowledge we are not utilizing the resources in a proper way. We are educated in our job profile but not educated on our health side. (34 years old IT professional, unmarried, male)

"In my company, there was a system tool which was developed to monitor the agent. How much time it takes for break and productivity is being calculated for each employee. This is interrelated to the incentive plan. This is built by senior software people. Every month there was product knowledge test, which is not liked by us. Management is very stubborn in assigning the work". (32 years, male, ITES professional)

"On inquiring about job title, "I don't know. Instead of calling a software engineer they call systems engineer. All kinds of junk work, useful and useless. You run popups and screenshots. More creative, you do some coding, test and application" (25 years, female, systems engineer in IT industry, more than 3 years)

"Handling manager is more tougher than handling project. I solved most difficult tasks but get 8% hike, whereas others who are pally with manager get 14% hike in salary" (23 years, male, IT sector)

Apart from the above, there were several reasons that professionals informed that they like in IT industry. These attributes included mostly about the quantum of money as they get salary and incentives (17%), and next commonest was their interaction with People (10%). The other likely

reasons were liking the challenges in work (8%) and flexible type of work (8%), ambience (6%), innovation at work (6%) while other listed high profile in society, application of logic, prospect of having long term career, like people in team, like timings, work culture, creativity at work, facilities, fun, independence, learning new things, like everything, travel and sharing knowledge.

Discussion

Several theories (9-18) and many number of studies (2, 6, 8, 11-13, 18, 25-33) have attempted to establish the causal link between stress and ill health. The perception and adaptive changes in response to stressors are mostly transient and contextually specific in nature. However, not much work has been done in describing the contextual stressors and their role in developing countries such as India. Our paper sheds light on this important aspect of exploring contextual specific stressors at the individual and organizational levels including adaptive responses to these factors. Our results indicate that there is constant interplay between stressors; buffers and positive attributes associated with the working conditions in IT/ITES professionals.

Among the positive attributes, most of the IT/ITES professionals were satisfied and expressed happiness with the infrastructure provided to them for work, salary they get, better quality of life and recognition they get from society. Among the stressors, the study identified contextual stressor domains at the individual level and some stressors at organization level. Support from family was an important and constant buffer factor to alleviate stress while the buffer role of lifestyle factors and emotional factors was varied among workers. These results are in conformity with model of allostatic load by Caplan. (8) The state of equilibrium within an internal and external environment is referred to as “Homeostasis”. (34) Bruce McEwen introduced the term Allostatic load in 2000, which refers to the effect of chronic exposure to the neural and/or neuroendocrine stress response on chronic diseases in general and for cardiovascular diseases

in specific. (8) In this model, job stressors refer to working conditions that may lead to acute reactions, or strains in the worker. These short-term strains, in turn, are presumed to have an impact on longer-term indicators of mental and physical health. The model comprises three components namely, individual factors, non-work factors, and buffer factors. This model guides us to measure allostatic load at the macro level. The inclusion of these three categories covers an array of personal and contextual factors that might be responsible for differences in the way individuals exposed to the same job stressors perceive and \ or react to the situation. (35-37)

Based on the results from this study, the workers in IT/ITES sectors enjoy good physical environment and better infrastructure. The physical infrastructure of office space in IT/ITES sector of Bangalore is similar to the offices in United States and other developed countries.(38-40) The evidence suggests that the infrastructure for other industries in Bangalore is average to very poor such as very high level of noise, no air conditioning, dust, lack of connectivity to the office and lack basic facilities.(41-44) The higher income among IT/ITES employees enables them to lead comfortable lifestyle without too many hassles that other workers in the middle-class generally face.(45) For example, they can easily afford two-wheelers or cars for shuttling to the office whereas most workers from other industries depend on public transport in Bangalore.(46) According to the results from this study, IT/ITES professionals are well respected in the society. This is due to their intellectual capabilities and also high socio-economic status. (47-50) There is evidence that higher social support improves the perception of overall wellbeing of workers. (51)

There are specific global level stimuli affecting demand and supply of skilled workforce in IT/ITES industries of India. The key factor among them is reduced costs and better efficiency of the tasks. The global factors influence priorities and goals of the local companies. However, the local companies will have to design their own work force policies based on their priorities and

perceptions of their own companies. The decisions made in the process of setting priorities of companies have a great impact on working condition of IT/ITES professionals. For example, in our study, it was found that companies who were based out of United States had standard policies regarding fair practices and incorporated the goals of welfare of their employees. This resulted in better productivity and better quality of life among their workers.

Notwithstanding the positive attributes expressed, the results from this study indicated presence of significant stressors based on the contextual information sought from the IT/ITES professionals. First, at individual level, this qualitative study identified nine stress domains namely job control, autonomy, time pressure, length of experience in industry, night shifts, income, appreciation of work, physical environment, work-environment and affect or emotional factors. The identification of these contextual stress domains has some important features.

First, Job control is an important factor in determining stress perception and coping. Job control is defined as “the extent to which employees control the scheduling, pacing, order, and so forth of monitored job activities”. (52) Earlier studies examining job control as a stressor support our results. (53-58) As found in the study, the degree to which workers can control the onset or timing of monitoring is an important factor in alleviating the stress at work place. (59) According to literature review, frequency of control exercised by managers, (60, 61) extent of control factors, [43] the person who makes the decision of allowing flexibility to workers (62-64) and characteristics of the individual who is the target in the “stress cascade” (65-68) are important determinants of job control related stress. In a study done to examine applicability of the Job Demands-Resources Model of burnout among rural development workers (N=194), job demands and rewards were equally important in accounting for levels of psychological stress. (69) A study on veterinary assistant surgeons by Triveni et al(31) reported that the major sources of job stress were numerous meetings, work load, lack of personal growth and

monotonous nature of work. Their study also identified lack of facilities and clear-cut policies, untimely supply of inputs and lack of conveyance to field visits as sources of organizational stress. In a study done to assess job stress in railway engine pilots, Sumit Prakash et al(70) reported statistically significant correlates with fatigue, ergonomics of work place, management pressure, high job demand, low control and low support at work and biological functions. In an ethnographic study of the low-income construction workers, Dhar describes emergence of two themes of work demand and stress leisure experiences. (71) In an another study, on the prevalence of occupational stress amongst nurses, 'Time Pressure' was found to be the most stressful whereas 'Discrimination' was the least stressful of the given possible sources of occupational stress in everyday life.(72) This study also identified that other sources of stress included balancing work-life requirements, own work situation and personal responsibilities. The study also reported a high level of skill requirement of the job as the most important stressor directly related to nursing profession. In a study of 33 full-time workers from eastern India, the physical workload aggravates by various ergonomic stressors present in the work place. (73) In a similar study but on workers in automotive industries, more than 28% of workers employed in multiple processes were at risk of heat stress-related health impairment. (74)In a study comparing the level of stress among 30 professors of the College of Agriculture, at Hyderabad, India, job stress was negatively and strongly correlated with experience and training received. (27) Further, supervisory pressure, changing job assignments, personal job characteristics explained about 22.8% of the total variance in the occupational stress among workers of fish processing activities in India. (75) In a study of 160 scientists at University of Agricultural Sciences, Dharwad, Karnataka, the majority of the scientists (62.50%) had a medium level of Job satisfaction and 17.50 per cent of them had a low level of job satisfaction.(76) In a systematic review done on job stress and hypertension, we found that there is lot of heterogeneity in assessing the job stress across several studies. The qualitative results suggest that this might be because the work environment and ethos for software professionals in India

are completely different compared to the same group in developed countries or foreign MNCs operating from India.

Second, we found that workers differentially perceive and report stress factors. One of the driving factors of this differential nature is the type of immediate supervisor/manager. If the manager mistrusts the worker or if the workers thought so, the propensity of trigger points was more and provoked feelings of unfair treatment, prejudice and causes stress. This construct has been referred to as “attributed trust”, defined as the extent to which workers believe that their supervisor trusts them to perform their work tasks without coercion.(77) According to the experiences of professionals, there were several overt and subtle methods of monitoring often construed as coercion assimilated in the regular execution of tasks. These can act as trigger events and might reinforce generalized positive or negative feelings about self and workplace.(78) These personal experiences modify the behaviour of workers over a period of time and thereby determine the priorities for work related aspects and overall performance. Based on the results from our study, we infer that perception of stressors by IT/ITES professionals is an important determinant of their behaviors in their workplace or in other places. This might include whether or not they choose to smoke, to follow relaxation techniques including exercises, and how professionals treat each other at work place. The constructs involved in support from supervisors and colleagues whilst monitoring have been discussed in literature. It is shown that supportive monitoring plays effective role in job satisfaction, alleviation of stress factors at work, improvements in teamwork and optimal organization functioning. (28, 79-82) There are several constructs involved in how workers are monitored. It is shown that monitoring mechanisms have subjective impacts on how workers perceive stress and how they cope with it. Several frameworks that have studied combination of different monitory mechanisms including surveillance, tracking, and observation support the findings from our study. (26, 83, 84) In their model, Peterson infers that organizational culture is a macro

determinant that determines management system's structures and behaviors. The health of organization and of employees is resultant of the management structures and behaviors, which is an antecedent quality of life. (85) The results from our qualitative study are supportive of this model.

Third, from the public health perspective, the level of knowledge and awareness among IT/ITES professionals about health in general and hypertension in specific was very poor. In a qualitative study done by Kusuma et al, hypertension has been perceived as a common and serious problem in the community of migrant workers and the theme of city life as major predisposing factor for developing hypertension. The study suggested that awareness and knowledge about hypertension and its consequences are inadequate in these communities. (86)

Fourth and most importantly, at the organization level, workplace culture emerged as a very important factor from the results of our study. Earlier evidence points to the importance of organizational culture in determining the health of professionals. (30, 85) Peterson and Wilson states in their paper that "Simply stated, culture matters." (85) They further state, "it matters because the consequences of ignoring an organization's culture can lead to undesirable outcomes for both the company and the workers." Work culture can mediate stress factors and ill health in several ways. IT/ITES professionals will have to confront the potential stressors routinely and this occurs repetitively over a period of time. The extent to which poor job control and unrealistic work expectations are widespread in the organization determines the level of negative emotional reactions such as frustration and aversive interpersonal relationships such as hostility or defensiveness. (85)

There is ample evidence to suggest that work culture is determined by assumptions and beliefs, which subsequently prescribe the way supervisors, managers, communicate and interact with

IT/ITES professionals. (87-89) Peterson et al in their model, describe that health of both organization and employees are very important. (85) The model describes organizational health as the well being of the corporate whole, which can be measured in terms such as productivity, performance, quality, competitiveness, and profit. In comparison, employee health involves traditional measures such as physical and mental sickness, absenteeism, and fatigue of the workers. (85)

The factors governing work culture are different for IT and ITES sectors. There is evidence of presence of several stressors affecting professionals in ITES sector. (90, 91) The trainings given to workers involve offering product knowledge and accent neutralization. Accent neutralization is process of training the ITES professionals to learn to speak in a neutral accent, one that is grammatically and phonetically correct without regional characteristics. In other words, they are trained to speak such that the clients cannot guess which part of the world the person belongs to. Also, it is required that the professionals assume false identities such as different name, or quote different location, speak to customers in different mannerisms, often all of which have been described by a term called “national identity management”, as coined by Poster. (92-94) The term national identity management refers to managing workers such that they will have to use fake name, speak in a fake accent and assume fake identities for longer time and endure monotonous work. (93, 94)

In a book on ITES sector, Thite et al mention that unfair practices in this sector can result in “emotional numbness and loss of touch with one’s true self”, a concept that has been termed as ego depletion. (92) Elsewhere, “Ego depletion” is explained as “the loss of a personal resource and associated breakdown in performance due to the previous exertion of self-control or other effortful and willful acts of the self”.(95) (96) Further, there is mounting evidence that ego depletion has adverse effects on cardiovascular health.(85, 97-101) Our results are in

conformity with other accounts of detailed description of unfair management practices. (102) These problems reflect that all these are complications stemming from policy level and not merely reflection of interpersonal problems or individual's perception.(102) (93) Also in India, there is an effective restraint on IT/ITES professionals from forming unions. (103-107) From our results, it was clear that companies adopt several ways to impede workers from assembling into any form of unions. This included enforcing legally binding employee contracts. Hence, they cannot attempt at solving their problems in organized manner.

Summary of findings and recommendations

Globally, there is an increased effort to shift jobs including the IT/ITES industry to low cost areas in developing countries such as India, which have a huge pool of lower paid, technically competent and English speaking workers. Our study finds that most of the time, Indian companies overemphasize their skillset and talent pool to the global clients in order to successfully bid and win IT/ITES projects. This results in creating unnecessary and heightened atmosphere of work pressure with unrealistic demands, often exploiting the professionals. As a result, there were nine identified contextual stressor domains in these industries. They are: Time pressure, length of work experience, shift work, job control, income related factors, autonomy, appreciation of work, physical environment and work environment within company. The study also identified the work culture is a predominant factor. One of the key themes in the domain of work culture is how supervisors monitor the employees. Our study also found positive attributes due to the nature of work in IT/ITES sectors. These included higher income, better physical environment and recognition from society.

Managements of IT/ITES industry can be apprised of the findings from this qualitative study. Transparent and fair practices can be promoted such as publishing the actual capabilities with

clear specification of skills by naming individuals and their attributes. The management of these industries can gain by increasing the productivity if they can allow their employees to express their grievances and obtain solutions. Employees should be provided both formal and informal platforms to express their concerns, problems and challenges. By working with the employees, the managements can identify even better ways of improving the productivity at reduced stress levels. It will be useful to examine the effect of these contextual stress domains on the health of IT/ITES professionals.

Evaluations of positive and negative impacts of occupational conditions through qualitative studies can help in understanding the comprehensive profile of workforces. There is a need for comparing the nature of specific problems and frequencies of the identified factors in IT/ITES industry with other occupational workforces in India.

Tables and Figures

Table-1: Descriptive statistics of qualitative sample of IT/ITES professionals, Bengaluru, 2011-12

Age Group (in years)	Number	Percentage
19 to 25	7	21.88
26 to 30	16	50.00
31 to 35	6	18.75
36 to 55	3	9.38
Total	32	100.00
Marital Status		
Married	13	40.63
Single	19	59.38
Total	32	100.00
Children		
No	23	71.88
Yes	9	28.13
Total	32	100.00
Education		
Pre-Degree	1	3.13
General Degree	12	37.50
Professional Degree	4	12.50
4) Post Graduate	11	34.38
Not mentioned	4	12.50
Total	32	100.00
Sector		
BPO	19	59.38
IT	13	40.63
Grand Total	32	100.00
Total		
Total Work Experience		
1) 0.0 - 2.0 Years	7	21.88
2) 2.1 - 7.0 Years	17	53.13
3) 7.1 - 12.0 Years	7	21.88
4) 13.1 - 28.0 Years	1	3.13
Total	32	100.00
Smoking		
No	6	18.75
No Idea	3	9.38
Yes	23	71.88
Total	32	100.00

Table.2: Description of themes of stress domains, qualitative study of IT/ITES professionals, Bengaluru-2011.

Theme of stress domains	Explanation
Length of experience in industry	The job title of professionals would reflect the amount of stress each person would have to bear with.
	Position and experience in the industry would determine the amount of time each one has to contribute per day towards work.
	Total number of years worked in current occupation determines how professionals perceive stress and how they cope with it
Time pressure	The total number of hours worked per day would determine how much time is left for individuals to spare for exercises, time to family and recreation activities.
	The number of working days per week should ideally be five. More often than not, this exceeds beyond 5 and takes time from weekends too.
	Many professionals feel stressful to travel to office and travel back due to traffic congestion, bad roads or poor vehicle
	Answering calls while at home regarding work and/or working from Home even after working at work-place determines amount of extra stress people will have to bear without any time for relaxation
	Taking breaks during workday are important for transient relief of work pressure, to be able to discuss problems with friends/colleagues and rebound back.
	Even when people take breaks, it will be stressful if professionals are under constant pressure to return to work or complete some assignment. The duration of breaks will be an important determinant of relaxation.
Night shifts	Working in night shifts has emerged as one of the key stressors for professionals working in ITES sector. Very few IT professionals were working in night shifts.
	For some workers, the schedule of night shifts was fixed extending for a fortnight to entire month while few others had rotating night shifts. Both kinds of night shifts affect the stress status of individuals.
	Even when night shifts had to be done, the frequency of night shifts was the most important determinant
	It is very important to catch up with sleep and rest after night shifts. Hence number of free days after working in night shifts is an important factor.
Job Control	Workers regarded that they lack the control of speed at which they work. Managers determined speed without consulting workers. Unrealistic expectations was common problem amongst workers
	Permission to work from home was given only in few sites. Such permissions were not given due to lack of trust on employees.
	Pushing workers for strict deadlines for completing a given job or task was another problem found in IT/ ITES sector.

	A flexible job allows people to take time off from work when wanted. Strict control by supervisors and managers puts pressure on workers.
	Receiving clear instructions or information regarding work is an important aspect. However, on assigning a new task many professionals are not even asked whether they are able to perform the work
Income	When pay was decided based upon how much an individual works was found to be least stressful while pay dependent on how much group works and hence was result of collective effort caused stress to better performing individuals.
	The emerged theme suggests least stress when salary can cover substantially more than basic needs and those of my family. At the other end of spectrum was high stress due to inability of salary to cover basic needs of self and family.
	Availability of options upgrading job title and advancing the career emerged as an important factor about genesis of stress.
Autonomy	Whenever people were in charge of deciding their own work schedule, they were least stressful and felt happy about it. However, a constant theme that emerged was lack of such autonomy being the cause of stress at work.
	Job stress depended on the person/s evaluating one's work. Good managers were able to positively reinforce the workers while some managers induced as cascade of stress within the system.
	The feeling of being constantly monitored due to visits by managers, emails, video monitoring and phone calls made workers stressful.
Appreciation of work	Not being appreciated for good work done emerged as constant problem at workplace while the presence of which showed positive atmosphere.
	Giving the credit for work by supervisors/managers was regarded as a virtue and was infrequent at worksite.
Physical environment	Having special seating arrangements, ventilation and lighting was regarded as an important factor for carrying out work.
Work-environment	Functioning of systems of handling several issues at work place are important factors. Some of them are system of identifying dilemmas at work and obtaining help from colleagues or supervisors. Also, in the presence of an established system for resolution of conflicts at workplace, people would easily resolve them. In the absence of this, there will be more stress. Transparency of working procedures and absence of discrimination are other important factors.
Affect or Emotional factors	Abuse of power or violations of norms of behavior at work, blaming for someone else's mistakes at workplace, bearing abusive communication at work place were important determinants of emotional responses in IT/ITES professionals.

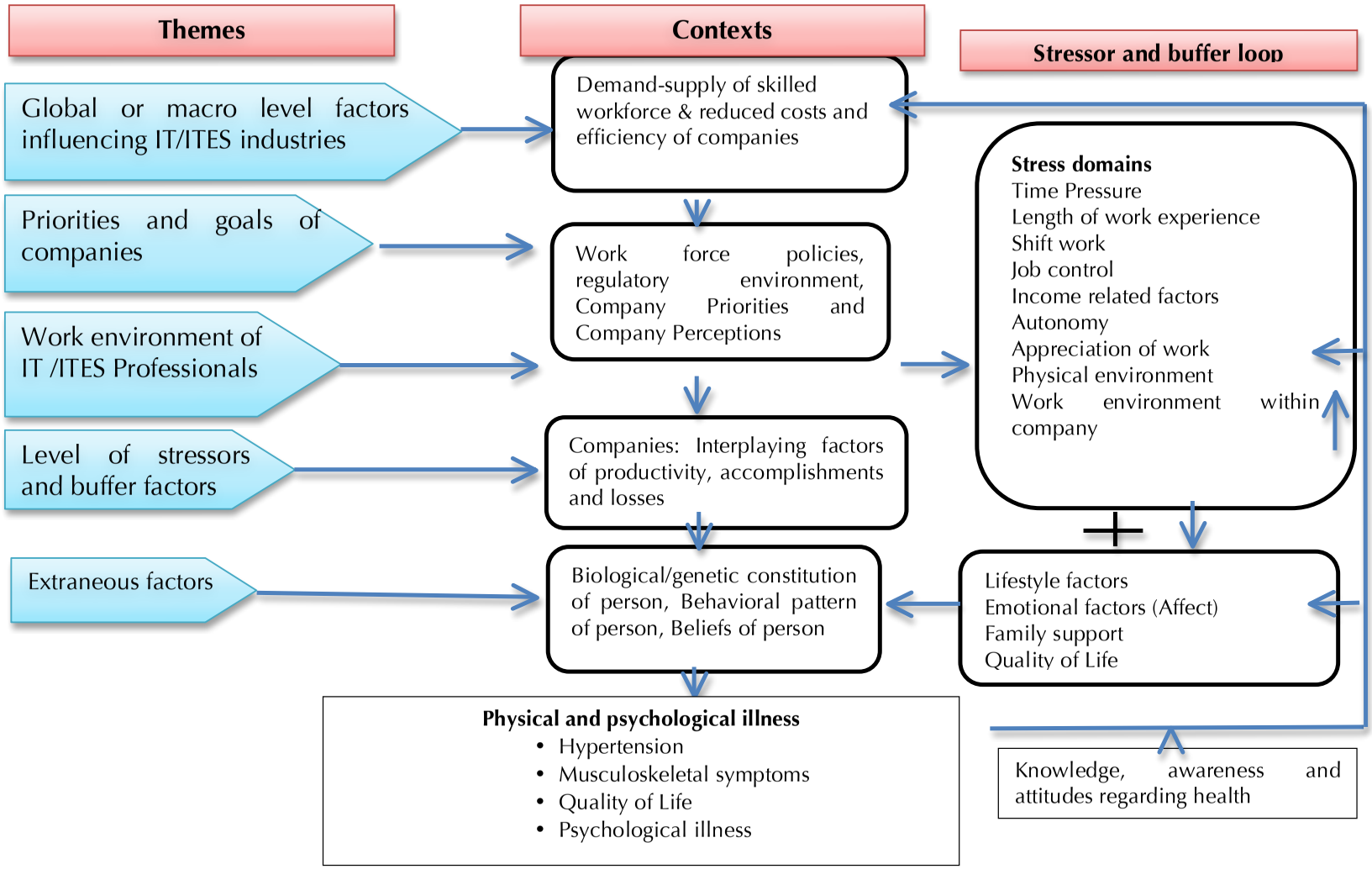

Figure.1: Conceptual Framework to understand job stressors in IT/ITES sectors, health outcomes and evidence feedback loop to address issues at different levels

References:

1. Rohith K, Shrinivas K, Sudhashree V. Issues and concerns of health among call center employees. Indian Journal of Occupational and Environmental Medicine. 2005;9(3):129-32.
2. U.S. National Institute for Occupational Safety and Health DN. Stress at Work. Publication Number 99-101Dictionary. 1999.
3. Kirmeyer SL, Diamond A. Coping by police officers: A study of role stress and Type A and Type B Behavior Patterns. Journal of Organizational Behavior. [10.1002/job.4030060303]. 1985;6(3):183-95.
4. Koeske GF, Kirk SA, Koeske RD. Coping with job stress: Which strategies work best? Journal of Occupational and Organizational Psychology. [10.1111/j.2044-8325.1993.tb00542.x]. 1993;66(4):319-35.
5. Latack JC. Coping with job stress: Measures and future directions for scale development. Journal of Applied Psychology. 1986;71(3):377-85.
6. Latack JC, Havlovic SJ. Coping with job stress: A conceptual evaluation framework for coping measures. Journal of Organizational Behavior. [10.1002/job.4030130505]. 1992;13(5):479-508.
7. Schuler RS. An integrative transactional process model of stress in organizations. Journal of Organizational Behavior. [10.1002/job.4030030103]. 1982;3(1):5-19.
8. Caplan RD, University of Michigan. Survey Research C. Job demands and worker health : main effects and occupational differences. Ann Arbor: Survey Research Center, Institute for Social Research, University of Michigan; 1980.
9. GRL H. Compensatory control in the regulation of human performance under stress and high workload: A cognitive-energetical framework. . Biol Psychol 1997;45:73-93.
10. Folkow B ST, Uvnas-Moberg K. Stress, Health, and the Social Environment. James P. Henry's Ethological Approach to Medicine. Acta Physiologica Scandinavica. 1997; 161 :Suppl 640.
11. Hans B, Michael GM, Harry H, Amanda CN, Eric B, Stephen AS. Low job control and risk of coronary heart disease in whitehall ii (prospective cohort) study. BMJ. 1997;314.
12. Karasek R, Brisson C, Kawakami N, Houtman I, Bongers P, Amick B. The Job Content Questionnaire (JCQ): An instrument for internationally comparative assessments of psychosocial job characteristics. Journal of Occupational Health Psychology. 1998;3(4):322-55.
13. Theorell T, Tsutsumi A, Hallquist J, Reuterwall C, Hogstedt C, Fredlund P, et al. Decision latitude, job strain, and myocardial infarction: a study of working men in Stockholm. The SHEEP Study Group. Stockholm Heart epidemiology Program. American Journal of Public Health. 1998 1998/03/01;88(3):382-8.
14. Alfredsson L, Spetz C-L, Theorell Tñ. Type of Occupation and Near-Future Hospitalization for Myocardial Infarction and Some Other Diagnoses. International Journal of Epidemiology. 1985;14(3):378-88.
15. Hammar N, Alfredsson L, Johnson JV. Job strain, social support at work, and incidence of myocardial infarction. Occupational and Environmental Medicine. 1998;55(8):548-53.
16. Johnson JV, Stewart W, Hall EM, Fredlund P, et al. Long-term psychosocial work environment and cardiovascular mortality among Swedish men. American Journal of Public Health. 1996;86(3):324-31.
17. Johnson JV, Stewart WF. Measuring work organization exposure over the life course with a job-exposure matrix. Scandinavian Journal of Work, Environment & Health. 1993;19(1):21-8.
18. Siegrist J, Peter R, Junge A, Cremer P, Seidel D. Low status control, high effort at work and ischemic heart disease: Prospective evidence from blue-collar men. Social Science & Medicine. 1990;31(10):1127-34.
19. India Mo. About Bangalore, downloaded from internet. Available from: http://www.mapsofindia.com/bangalore/bangalore.html on 4 May 2009.

20. Karnataka Go. document on Bangaloreit.biz, downloaded from internet Available from: http://www.bmponline.org/eng-dept/sulaba-nakshe.shtml on 4 May 2009.
21. Ministry of Communications and Information Technology GoI. Annual report, Information Technology, 2007- 08.
22. Inc. A. New Oxford American Dictionary. . © 2005-2011
23. Dedoose. version 3.1.: SocioCultural Research Consultants, LLC. ; 2011; Available from: http://www.dedoose.com.
24. Muhr T. ATLAS. ti: Scientific Software Development; 1998.
25. Hyman J, Baldry C, Scholarios D, Bunzel D. Work-Life Imbalance in Call Centres and Software Development. British Journal of Industrial Relations. [10.1111/1467-8543.00270]. 2003;41(2):215-39.
26. Nebeker DM, Tatum BC. The Effects of Computer Monitoring, Standards, and Rewards on Work Performance, Job Satisfaction, and Stress1. Journal of Applied Social Psychology. [10.1111/j.1559-1816.1993.tb01101.x]. 1993;23(7):508-36.
27. Padmaja P, Prabhakar K. Stress of professrs working in Angrau, Rajendranagar, Hyderabad. Journal of Research ANGRAU. 2011;39(1/2):72-3.
28. Smith MJ, Carayon P, Sanders KJ, Lim SY, LeGrande D. Employee stress and health complaints in jobs with and without electronic performance monitoring. Applied Ergonomics. 1992;23(1):17-27.
29. Soderfeldt B, Soderfeldt M, Muntaner C, O'Campo P, Warg LE, Ohlson CG. Psychosocial work environment in human service organizations: a conceptual analysis and development of the demand-control model. Social science & medicine (1982). 1996;42(9):1217-26.
30. Thompson N, Stradling S, Murphy M, O'neill P. Stress and organizational culture. British Journal of Social Work. 1996;26(5):647-65.
31. Triveni G, Rao, B. S. Prasad. A. Sources of personal, familial, job and organizational stress among veterinary assistant surgeons - a diagnostic study. . Journal of Research ANGRAU. 2006;34(4):68-72.
32. Belkic K SC, Theorell T, Cizinsky S. WHO Psychosocial Center. Work Stressors and Cardiovascular Risk Assessment for Clinical Practice. Part I. Stockholm. : Karolinska Institute, ; 1995.
33. Landsbergis PA. The Changing Organization of Work and the Safety and Health of Working People: A Commentary. Journal of Occupational and Environmental Medicine. 2003;45(1).
34. McEwen BS. Allostasis and Allostatic Load: Implications for Neuropsychopharmacology. Neuropsychopharmacology 2000;22 108-24.
35. Cooper CL, Marshall J. Occupational sources of stress: a review of the literature relating to coronary heart disease and mental ill health. Journal of Occupational Psychology. [10.1111/j.2044-8325.1976.tb00325.x]. 1976;49(1):11-28.
36. Ganster DC. Antecedents and Consequences of Employee stress: Final Report. : NIMH 1984.
37. Greenberger DB, Cummings LL, Dunham RB. Personal Control at Work: Its Conceptualization and Measurement. 2002.
38. Vagadia B. Offshoring Leaders, Laggards and Hopefuls. Strategic Outsourcing. 2012:175-98.
39. Holzweber M, Mattsson J, Chadee D, Raman R. 7. Innovation strategy in the Indian IT service industry: user centred issues on innovation. User-Based Innovation in Services. 2012:145.
40. Rai S. Is the next Silicon Valley taking root in Bangalore? New York Times. 2006.
41. Dinesha H, Agrawal V. Advanced Technologies and Tools for Indian Rural School Education System. education. 2011;36(10).
42. Kaul R. Accessing Primary Education: Going Beyond the Classroom. Economic and Political Weekly. 2001:155-62.

43. Benjamin S. Governance, economic settings and poverty in Bangalore. Environment and Urbanization. 2000;12(1):35-56.
44. Nunan F, Satterthwaite D. The Influence of Governance on the Provision of Urban Environmental Infrastructure and Services for Low-income Groups. International Planning Studies. 2001 2001/11/01;6(4):409-26.
45. English-Lueck JA. Cultures@ Silicon Valley: Stanford Univ Pr; 2002.
46. Sabapathy A, Flachsbart PG, Saksena S. Commuting patterns of employees in the Information Technology and traditional manufacturing sectors of Bangalore, India. Transport Policy. 2012;19(1):155-66.
47. Hyde A. Working in Silicon Valley: economic and legal analysis of a high-velocity labor market: ME Sharpe Inc; 2003.
48. Dittrich C. Bangalore: divided city under the impact of globalization. Asian Journal of Water, Environment and Pollution. 2005;2(2):23-30.
49. Parthasarathy B, Aoyama Y. From software services to R&D services: local entrepreneurship in the software industry in Bangalore, India. Environment and Planning A. 2006;38(7):1269-85.
50. Sudhira HS, Ramachandra TV, Subrahmanya MHB. Bangalore. Cities. 2007;24(5):379-90.
51. Rusli B, Edimansyah B, Naing L. Working conditions, self-perceived stress, anxiety, depression and quality of life: A structural equation modelling approach. BMC Public Health. 2008;8(1):48.
52. Carayon P. Effect of Electronic Performance Monitoring on Job Design and Worker Stress: Review of the Literature and Conceptual Model. Human Factors: The Journal of the Human Factors and Ergonomics Society. 1993;35(3):385-95.
53. Aiello JR, Kolb KJ. Electronic performance monitoring and social context: Impact on productivity and stress. Journal of Applied Psychology. 1995;80(3):339-53.
54. Cohen JL. Social facilitation. Motivation and Emotion. 1979;3(1):19-33.
55. Hales TR, Sauter SL, Peterson MR, Fine LJ, Putz-Anderson V, Schleifer LR, et al. Musculoskeletal disorders among visual display terminal users in a telecommunications company. Ergonomics. 1994 1994/10/01;37(10):1603-21.
56. Pearson CAL. An Assessment of Extrinsic Feedback on Participation, Role Perceptions, Motivation, and Job Satisfaction in a Self-Managed System for Monitoring Group Achievement. Human Relations. 1991;44(5):517-37.
57. US Congress OoTA. The electronic supervisor: New technology, new tensions, OTA-CIT-333
. US Government Printing Office, Washington, DC US Congress, Office of Technology Assessment1987.
58. Westin AF. Two key factors that belong in a macroergonomic analysis of electronic monitoring: Employee perceptions of fairness and the climate of organizational trust or distrust. Applied Ergonomics. 1992;23(1):35-42.
59. Stanton JM, Barnes-Farrell JL. Effects of electronic performance monitoring on personal control, task satisfaction, and task performance. Journal of Applied Psychology. 1996;81(6):738-45.
60. Lund J. Electronic performance monitoring: A review of research issues. Applied Ergonomics. 1992;23(1):54-8.
61. Niehoff BP, Moorman RH. Justice as a Mediator of the Relationship between Methods of Monitoring and Organizational Citizenship Behavior. The Academy of Management Journal. 1993;36(3):527-56.
62. Critchfield TS, Vargas EA. Self-Recording, Instructions, and Public Self-Graphing. Behavior Modification. 1991;15(1):95-112.
63. Dickinson TL MR. A Conceptual Framework for Teamwork Measurement. Mahwah, editor: NJ: Lawrence Erlbaum Associates Inc, ; 1997.

64. McCurdy BL, Shapiro ES. A Comparison of Teacher-, Peer-, and Self-Monitoring with Curriculum-Based Measurement in Reading Among Students with Learning Disabilities. The Journal of Special Education. 1992;26(2):162-80.
65. Brewer N, Ridgway T. Effects of supervisory monitoring on productivity and quality of performance. Journal of Experimental Psychology: Applied. 1998;4(3):211-27.
66. Komaki JL, Barwick, K. D., Scott, L. R. A behavioral approach to operational safety: Pinpointing and reinforcing safety performance in a food manufacturing plant. Journal of Applied Psychology. 1978;63, :434-45.
67. Larson JR, Callahan C. Performance monitoring: How it affects work productivity. Journal of Applied Psychology. 1990;75(5):530-8.
68. Wilton C. Feedback systems. System Performance Division. 1971.
69. Vinita Duraisingam D, M. F. The management of psychosocial risk factors amongst rural development workers in India. International Journal of Rural Management. 2005;1(1):97-123.
70. Saran N, Khapre P, Laha S, Prakash S. Study to assess the level of stress and identification of significant stressors among the railway engine pilots. Indian Journal of Occupational and Environmental Medicine. 2011;15(3):113-9.
71. Dhar RL. Leisure as a way of coping with stress: an ethnographic study of the low-income construction workers. Leisure/Loisir. 2011 2011/08/01;35(3):339-60.
72. Bhatia N KJ, Anand T, Jiloha RC. . Occupational Stress Amongst Nurses of Two Tertiary Care Hospitals in Delhi. Australasian Medical Journal. 2010;3(11):731-8.
73. Samanta A, Saha P, Biswas R. Cardiac strain of confectionery worker in relation to heat exposure during regular work shift. Indian Journal of Occupational and Environmental Medicine. 2011;15(3):120-6.
74. Ramalingam A, Sambandam S, Paramasivan R, Kalpana B. Work-related heat stress concerns in automotive industries: a case study from Chennai, India. Global Health Action; Vol 2 (2009) incl Supplements. 2009.
75. Nag PK, Nag A. Hazards and health complaints associated with fish processing activities in India,ÄîEvaluation of a low-cost intervention. International Journal of Industrial Ergonomics. 2007;37(2):125-32.
76. Kiran TR, Halakatti, S. V, Hirevenkangoudar, L. V, Jahagirdar, K. A.Hawaldar, Y. N. Analysis on job related variables of scientists. Karnataka J Agric Sci,. 2010;23 (2):274-6
77. Strickland LH. Surveillance and trust1. Journal of Personality. [10.1111/j.1467-6494.1958.tb01580.x]. 1958;26(2):200-15.
78. Kidwell RE, &Bennett, N. . Employee reactions to electronic control systems. . Group and Organization Management. 1994;19:203–18.
79. Komaki JL. Toward effective supervision: An operant analysis and comparison of managers at work. Journal of Applied Psychology. 1986;71(2):270-9.
80. Chalykoff J, Kochan TA. COMPUTER-AIDED MONITORING: ITS INFLUENCE ON EMPLOYEE JOB SATISFACTION AND TURNOVER. Personnel Psychology. [10.1111/j.1744-6570.1989.tb00676.x]. 1989;42(4):807-34.
81. Eisenhardt KM. Agency Theory: An Assessment and Review. The Academy of Management Review. 1989;14(1):57-74.
82. Dickinson TL, editor. Team performance and teamwork measurement. . Overcoming key obstacles in team research, Symposium conducted at the annual meeting American Psychological Society, Chicago; 1993, June; In R. M. McIntyre (Chair),: American Psychological Society, Chicago.
83. Amick Iii BC, Smith MJ. Stress, computer-based work monitoring and measurement systems: a conceptual overview. Applied Ergonomics. 1992;23(1):6-16.
84. DeTienne KB. Big brother or friendly coach? Futurist. [Article]. 1993;27(5):33.
85. Peterson M, Wilson JF. The culture-work-health model and work stress. American Journal of Health Behavior. 2002;26(1):16-24.

86. Kusuma YS. Perceptions on hypertension among migrants in Delhi, India: a qualitative study. BMC Public Health. 2009;9(267):(28 July 2009).
87. Schein EH. The corporate culture survival guide (new and rev. ed.): San Francisco, CA, US: Jossey-Bass; 2009.
88. Griffiths A, Cox T, La Ferla F. A healthier work environment. 1994.
89. DiMaggio P. Culture and cognition. Annual review of sociology. 1997:263-87.
90. Ramesh BP. 'Cyber Coolies' in BPO: Insecurities and Vulnerabilities of Non-Standard Work. Economic and Political Weekly. 2004:492-7.
91. Zapf D, Isic A, Bechtoldt M, Blau P. What is typical for call centre jobs? Job characteristics, and service interactions in different call centres. European Journal of Work and Organizational Psychology. 2003;12(4):311-40.
92. Thite M, Russell B. The Next Available Operator: Managing Human Resources in Indian Business Process Outsourcing Industry: Response Books; 2009.
93. Trivedi C. Towards a social ecological framework for social entrepreneurship. Journal of Entrepreneurship. 2010;19(1):63-80.
94. Taylor P, Bain P. India calling to the far away towns. Work, Employment & Society. 2005;19(2):261-82.
95. Muraven M. Ego Depletion. Encyclopedia of Social Psychology. 21 Nov. 2011 ed: SAGE Publications; 2007.
96. Baumeister RF, Bratslavsky E, Muraven M, Tice DM. Ego depletion: Is the active self a limited resource? Journal of personality and social psychology. 1998;74(5):1252.
97. Peter R, Alfredsson L, Hammar N, Siegrist J, Theorell T, Westerholm P. High effort, low reward, and cardiovascular risk factors in employed Swedish men and women: baseline results from the WOLF Study. Journal of Epidemiology and Community Health. 1998;52(9):540-7.
98. Kasl SV. The influence of the work environment on cardiovascular health: a historical, conceptual, and methodological perspective. Journal of Occupational Health Psychology. 1996;1(1):42.
99. Dunnagan T, Peterson M, Haynes G. Mental health issues in the workplace: A case for a new managerial approach. Journal of Occupational and Environmental Medicine. 2001;43(12):1073.
100.Gibb S. The state of human resource management: evidence from employees' views of HRM systems and staff. Employee Relations. 2001;23(4):318-36.
101.West M, Patterson M. Profitable personnel. People Management. 1998;4(1):28-31.
102.Gurjar N. A Practitioner's Perspective on the Indian Info-services Industry. The next available operator: Managing human resources in Indian business process outsourcing industry. 2009:115-44.
103.Schware R. Software industry entry strategies for developing countries: A. World Development. 1992;20(2):143-64.
104.D'Costa AP. The Indian software industry in the global division of labour. India in the Global Software Industry: Innovation, Firm Strategies and Development, Basingstoke: Palgrave Macmillan. 2004:1-26.
105.Taylor P, D'Cruz P, Noronha E, Scholarios D. Union formation in the Indian call centre/BPO industry. 2009.
106.Taylor P, D'Cruz P, Noronha E, Scholarios D. Indian call centres and business process outsourcing: a study in union formation. New Technology, Work and Employment. 2009;24(1):19-42.
107.Noronha E, D'Cruz P. Organising call centre agents: emerging issues. Economic and Political Weekly. 2006:2115-21.

Chapter.4: Job stressors and Hypertension in IT/ITES professionals

Introduction

Most of the developing countries are undergoing epidemiological transition with high rates of infectious diseases in addition to non-communicable diseases (NCD). Specifically, the burden of cardiovascular diseases is rapidly rising and requires urgent attention. (1) The risk factors for poor cardiovascular health can be Genetic, behavioral and due to other medical conditions. Among these, modifiable and physiological factors including hypertension, hyperlipidemia, smoking, obesity, sedentary living, and diabetes account for 80 percent of clinical cardiovascular disease in every region of the world.(2-4)

Hypertension is a major contributor to the worldwide epidemic of cardiovascular disease. (4-7) Hypertension or raised blood pressure is defined as systolic blood pressure of ≥140 mmHg and/or diastolic blood pressure of ≥90 mmHg, or using medication to lower blood pressure. It is estimated that hypertension causes 7.5 million deaths worldwide amounting to 12.8% of the total of all annual deaths.(8) This also translates into 57 million DALYs or 3.7% of total DALYs. Raised blood pressure is a major risk factor for debilitating diseases such as coronary heart disease (CHD). (9) For example, the risk of cardiovascular disease doubles for each incremental rise of 20/10 mmHg of blood pressure for individuals aged 40 to 70 years.(10) Complications of raised blood pressure include heart diseases, stroke, heart failure, peripheral vascular disease, renal impairment, retinal hemorrhage and visual impairment. (11, 12)

The increasing burden of morbidity in both developed and developing countries is attributable to the increasing incidence of non-communicable diseases, perhaps due to urbanization-induced risk factors. Further, some non-communicable diseases (NCD) such as Hypertension manifest at relatively early ages affecting a large proportion of the population especially in young adults.(1) According to Kearney et al, the prevalence of hypertension is more in economically

developed countries (37·3%) than in economically developing ones (22·9).(5) The number of adults with hypertension is predicted to increase by about 60% to a total of 1·56 billion (1·54–1·58 billion) in 2025, which is probably an underestimate. (5, 13, 14)

Many Risk factors leading to hypertension are modifiable and therefore provide an opportunity for preventive efforts. (15-18) Hence any intervention that can successfully prevent or reduce hypertension should be viewed as promoting cardiovascular health of individuals. There are several attempts to prevent hypertension by interventions targeting risk factors such as smoking, salt intake and obesity. However, modifying individual risk factors is difficult. (19-21) Instead, successful interventions such as the "North Karelia Project" have tackled social determinants, by developing comprehensive community-based strategies to change general dietary habits.(22-24) There is an imperative need for population based research to understand the social determinants at the community level influences about choices and options for people to smoke, not exercise and overeat.(25) Workplace settings provide opportunities to explore determinants of these negative behaviors. (26)

Among environmental factors, job stress is an important determinant of hypertension and is well studied in developed countries. (27-53) Job stress is defined as "A set of psychosocial factors experienced by workers due to work conditions, generated as composite experiences at different levels within an organization". Similar definitions have been adopted in developing models of Job stress. (54) (55) There are several factors identified as stressors in an environment involving human-computer interfaces. These include heavy workload, time pressure, low job control, limited employee training, monotonous tasks and poor supervisory relations and job security.(56) It is very important to understand the role of stress at the organizational level and understand how this relates to hypertension in low and middle-income countries (LMIC) such as India. It is estimated that in LMIC, a smaller proportion of healthy workforce will have to bear responsibility for a large and increasingly aging population. (57)

Hence public health researchers in these countries need to recognize the window of opportunity to address factors that can reduce cardiovascular disease risk at work places. (1, 57, 58)

It is known that workers in the Information Technology (IT) and Information Technology Enabled Services (59) sectors are predisposed to several risk factors for NCD's.(25, 60-62) Because most IT and ITES sectors are located in urban areas, lifestyle, dietary habits, commuting and other factors have become relevant and important factors affecting the health of workers. (34, 63, 64) Characteristically, professionals engaged in jobs in the I.T / ITES sector are very young with most of them in age group of 25-30. This age group has increased prevalence of coronary risk factors as established by studies done in India and elsewhere.(61, 65-68) However, there are no studies done in India that document job stress and its relation to hypertension among the IT/ITES professionals.

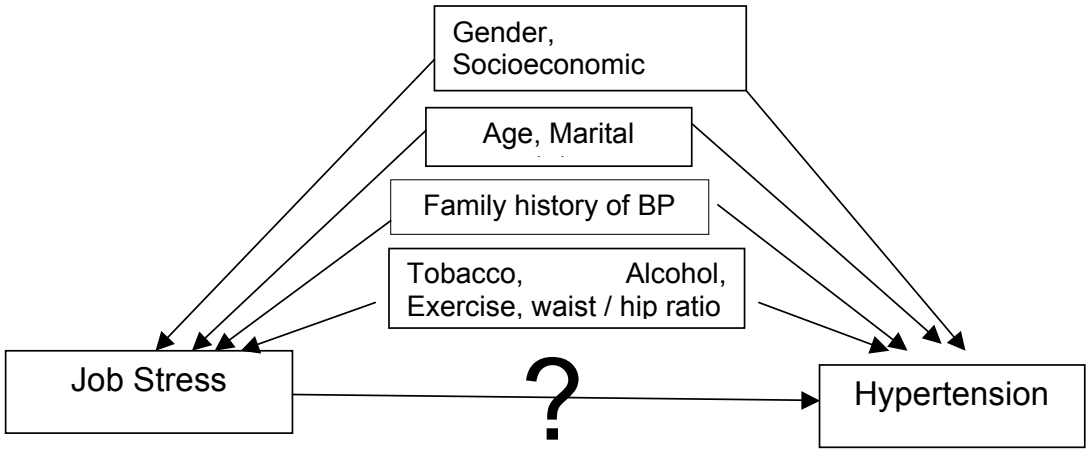

Fig.1: DAG depicting hypothesized association of Job stress and Hypertension

We conducted a cross sectional study among professionals working in the information technology (I.T) and information technology enabled services (I.T.E.S) sectors. In this study, we estimated prevalence of Job stress and its association with Hypertension. Understanding the

prevalence's of job stress and other risk factors within this specialized workforce can help to prevent morbidity related complications. Identification of risk profiles in this workforce can guide worksite interventions to prevent debilitating conditions thereby improving the productivity of the workforce.

Our hypothesis is that job stress is associated with Hypertension among IT/ITES professionals in Bangalore.

Methods

A detailed description of methods in the study is provided in a earlier chapter on methods.(69) Pertinent important portions of methods are presented in this paper. The source population comprised all I.T/I.T.E.S professionals aged 20-59 years working in "technical functions" in 21 selected worksites (units) of the I.T/I.T.E.S sector willing to join the study. By Technical functions, we mean all job categories involving a human-computer interface within the companies selected for the study. (70)

We employed a basic Mixed Methods sampling strategy for selecting the IT/ITES professionals as volunteers in the study. (71-73) A total of twenty-one sites in these areas were covered and no major zone was left out. (70) Bengaluru's IT/ITES industry is located in two core zones, one at Electronics City and another at Whitefield. There are several other clusters in Bellandur, Challaghatta, Bannerghatta road, Outer and Inner Ring Roads, C. V. Raman Nagar, many other small companies are scattered all over the city. We took at least one IT/ITES sector from each of these zones, based on the permission provided by the company. Hence, the first stage of sampling involved stratification of the locations of IT/ITES companies. The second stage involved selecting companies within the strata of zones having IT/ITES companies. The sampling was done such that three companies each were selected from electronic city (all IT)

and Whitefield (2 IT, 1 ITES), areas that had the highest number of IT/ITES companies. The remaining 15 sites were selected such that there was one company representing at least every geographical area having IT/ITES companies in Bangalore. (70) We included 1071 subjects in the total sample and 509 subjects in the IT sector and 472 subjects in the ITES sector.(69)

In each zone, permission was sought to conduct the research concurrent with health check up camps conducted in the respective industries. The quantitative studies were conducted in the closed rooms with facilities for blood pressure measurements, taking anthropometric measurements and for ensuring privacy of the individuals. Employees were invited to take part in the study after completing routine health check ups organized by the company. On agreement of the volunteer, a questionnaire was handed over. Volunteers then completed the questionnaire in a separate room provided by the companies or completed it at their place of choice and would return them at the end of day or the next day.

Our study was anonymous; in that, we didn't collect any identifying information from participants such as name, email id, phone number or even name of company. At the outset, the interviewers emphasized the confidentiality and importance of the responses, and let people know that the names or any identifying information were not recorded (anonymous). Potential participants were explained that the study wanted to understand about their work environment and how it affects them, and that this information is not available anywhere else. We administered "informed consent", and specifically requested permission to record the interview.

Exposure assessment

A job stress questionnaire was self-administered to collect information on job stress and other risk factors. Specifically, we used two different types of exposure assessments. The first

measure was The Occupational stress index (74) (74), a validated, reliable and tested measure that has pre-defined specific domains of job stress. OSI is a composite score of specific domains and we tested all the domains of OSI regarding their association with hypertension in IT/ITES professionals. The scores of OSI and their domains were calculated and were categorized into tertiles. It is established as a meaningful approach since there is no evidence in actual distribution of these stress domains such as in the IT/ITES professionals of India. (75-81) Similar approach has been adopted earlier in 10-year program for MONItoring CArdiovascular diseases (MONICA), involving centers 39 all over the world.(82, 83)

It is important to understand the work environment comprehensively as the stressors can originate only in some of the components. Brabant et al describe this as "globality of the work environment" (84) to denote comprehensive assessment of physical, ergonomic, and organizational stresses at workplace. The Occupational stress index (74) was developed as a comprehensive assessment of all the probable job stressors that might have an impact on health. (85-87) The questionnaire incorporates numerous theories of stress and cardiovascular dysfunction. The questionnaire itself is developed based on cognitive and ergonomic findings from neurophysiology examinations. It contains 58 equally weighted factors with highest scores reflecting extreme exposure. The sum of the scores of all 58 factors contains the total OSI, reflecting the sum total of overall burden upon the person in a given set of working conditions. We used OSI for subjects who work daily with computers (version: 2004) with permission from Dr. Karen Belkic. (Permission granted: May 20, 2009) (87) The criterion validity (Cronbach's a=0.84) of the total OSI has been demonstrated with respect to its ability to identify high-risk occupations. (87) There are specific sub-domains described under OSI, underload, high demand, strictness, time pressure, aversiveness/noxious exposures, avoidance and conflict. A detailed description of the OSI has been provided in Methods paper.(69)

Secondly, we identified contextual stress domains based on our qualitative study.(88) We thought that these contextual domains would better describe the stressful conditions of the IT/ITES industry as the information regarding these domains was directly collected from the professionals. These are time pressure, length of experience, shift work, job control, income, autonomy, appreciation of work, physical environment, work-environment and affect. The details regarding estimation of each domain is provided in chapter.2. The estimation of two domains is provided here as examples here. The autonomy domain of stress was estimated by calculating the weighted average of responses to questions on "who is in charge of deciding your work schedule?" "Who evaluates your work?" and "Is your work constantly monitored?" Here, each question had three responses. We calculated the sum of all three questions on a total of nine and multiplied by 100. Appreciation of work was estimated by estimating the weighted average of responses to questions "Is your good work appreciated or recognized at your workplace?" and "has the credit for your work is taken by your supervisor?". All the stress domains were coded such that for increasing order of contextual stress.

Outcome measurement

Peter Schnall and Karen Belkic have provided a detailed description of the importance of obtaining point estimates of blood pressure (BP) approximating ambulatory BP.(89) In their article, a new BP protocol is described for obtaining point estimates of BP while a subject is actually working (in contrast to the American Heart Association protocol for casual clinic BP recording, 1982).(90) We followed this protocol with slight modifications. (Panel -1)

Blood Pressure classification is done based on 7th report of Joint National Commission (JNC-VII).(10) According to this classification, normal subjects will have Systolic Blood Pressure (SBP) of less than 120 mm HG and Diastolic Blood Pressure (DBP) of less than 80 mm Hg. Subjects are assigned as Pre-hypertensives if their SBP falls within range 120-139 or DBP falls

within 80-89 mm HG. A diagnosis of Stage 1 Hypertension is done when the SBP is within range of 140-159 or DBP within 90-99 mm HG. Stage 2 Hypertension is diagnosed when SBP is equal or more than 160 mm HG or DBP is equal or more than 100 mm HG.

Confounder measurement

We collected details on variables that might be associated with exposure and outcome variables under each of the hypotheses. (Fig.1) The variables specific to potentially confound the association of job stress and hypertension were included in the model for analysis. These are dietary intake, physical activity, tobacco use (ever and current), socio economic status (91), alcohol intake, shift work and leg length(92). The detailed description regarding the measurements of these variables is provided in chapter.2: Methods. We included these variables based on the literature review and contextual knowledge. Stress is known to be associated with dietary intake,(93) physical activity(94-96), tobacco use (ever and current),(97, 98) socio economic status,(99, 100) alcohol intake(101-103), shift work(104-107) and prenatal and childhood exposures.(108) The proxy for nutritional status is leg length as reflected in several studies. (92) Further, there have been number of studies that have established the association of these factors with hypertension.(2, 14, 17, 20, 26, 44, 66, 82, 92, 109-113)

Panel.1: Protocol for Obtaining a Point Estimate of Work-time BP*

Part 1: Prior to obtaining point measurements at the workplace, we obtained informed consent, estimated whether our sphygmomanometers fit arm circumference of individuals, ensured that clothing wouldn't interfere with reading (e.g., loose shirts, accessible arms), obtained information on medical history (whether hypertensive or not). We used simple accurate equipment—a carefully calibrated aneroid digital sphygmomanometer.

Part 2: Protocol for obtaining two sets of point estimates. Conducted while individuals took time to attend the health check-up while working.

1 Trained observers such as a nurse or health professionals took all measurements.
2 We avoided "clinic atmosphere" and hence no white coats were used or in principle, we ensured none of the staff at research kiosk acted like clinicians.
3 Our general aim was to engage in informal interactions and neutral conversations by specifically avoiding conversations that are of personal relevance to the participant and also avoiding discussion of any controversial issues during BP collection.
4 We obtain two sets of point estimates in one workday while subject was at usual work activity.
5 First BP estimate was obtained near start time at beginning of shift (workday). However, due to the anonymous nature of the study, we didn't write down name of the worker, name of worksite and time of measurements. All the measurements were taken while the subjects were sitting as the protocol demands that BPs to be determined with worker in same position as at work. The second BP estimate was taken later in same workday.
6 We used calibrated aneroid sphygmomanometer after determining proper cuff size
7 The actual point estimate measurements were taken as follows:-
    a. First set:
        i. Taken at workplace in similar settings of their workstation with shortest possible interruption of work process
        ii. one reading for each point estimate**
    b. Second set: We repeated the steps as above. This is the best single estimate because subject is desensitized.
    c. We did not average first and second readings for best estimate but used the second estimate as our best estimate***
    d. We provided BP results to subject only after second set of estimates obtained

Modified from protocol suggested by Peter Schnall and Karen Belkic.
** The earlier protocol suggests three readings but we took two readings due to practical feasibility and as per standard clinical practice in India.
*** They earlier protocol suggests average of 1st and 2nd reading, we used only 2nd reading, as it was the best single point estimate

Analysis

The data from the cross sectional survey was analyzed using SAS 9.1.3104(114).

We followed the following data layout for planning statistical analysis for the current study.

Table. 1: Analysis layout for cross sectional study

Disease	Exposed-High	Exposed-moderate	Exposed-Low	Total
Present	a	b	c	M_1
Absent	d	e	f	M_0
Total	N_1	N_2	N_0	T

Prevalence's of Hypertension among those with high levels of job stress is given by $P_1=a/N_1$, with moderate levels of job stress is $P_2=b/N2$ and low-exposed is given by $P_0=c/N_0$. Measures of prevalence association can be estimated assuming steady state kinetics, in which disease duration and incidence rate are constant. (115) The crude prevalence odds of hypertension is equal to the incidence rate (I) times average disease duration (D):

$$P/(1-P)=ID \text{ --------- } (1)$$

The prevalence odds in equation 1 is the basic outcome measure in the cross sectional study. We can use the equation 1 to calculate prevalence Odds ratio as follows.

$$PO_1= [(P_1/ 1-P_1)/ (P_0/ 1-P_0)] \text{ --------- } (2)$$

$$PO_2= [(P_2/ 1-P_2)/ (P_0/ 1-P_0)] \text{ --------- } (3)$$

Where subscript 1 indicates exposed to high levels of job stress and 2 indicates being exposed to moderate levels of job stress and 0 is the reference level (low levels of job stress)

Restating the equation 2 and 3, we will have $PO_1=I_1D_1$, $PO_2=I_2D_2$ and $PO_0=I_0D_0$, where I is crude incidence rate times the average duration D, 1 and 0 refer to highly exposed and low exposed workers. Alternatively, we can calculate prevalence ratio (109) as

$$POR_1=PO_1/PO_0=I_1/ I_0=IR_1 \text{ --------- (4)}$$

$$POR_2=PO_2/PO_0=I_2/ I_0=IR_2\text{--------- (5)}$$

We adjusted the equations for the confounders and reported adjusted prevalence odds ratio.

The basic regression model was of the following form:

$$Y=b_0 + b_1X_1+ b_2X_2+. \ldots\ldots\ldots+ b_kX_k+e\text{---- (6)}$$

We used ordinal logistic regression for all our estimates. For (k+l) ordered categories, these quantities are defined as follows

$$P\ (Y\leq i)= p_1+p_2+\ldots..+p_i\text{--- (7)}$$

$$odds\ (Y\leq i=i)= [(P(Y\leq i)/(1- P(Y\leq i)]=[(\ p_1+p_2+\ldots..+p_i)/(p_{i+1}+\ldots+p_{k+1})]\ \text{--- (8)}$$

$$logit\ (Y\leq i=i)= ln[(P(Y\leq i)/(1- P(Y\leq i)],\ i=1,\ldots,k\text{--- (9)}$$

There were four ordinal categories of blood pressure (outcome variable: Y), ordered as Normal, Pre-hypertension, Stage 1 and Stage 2 Hypertension (JNC-VII criteria). Instead of using polytomous logistic regression model, as this model does not make use of the information about the ordering, we used cumulative probabilities (interrelated to cumulative odds and cumulative logits, equations 10 & 11) model. (116) (117)

The cumulative logistic model for outcomes arranged in ordinal categories is given by

$$Logit\ (Y\leq i=i) = a,+p_iX.+\ldots+p_{im}X_m,\ i=l,\ldots,k\text{--- (10)}$$

The model is similar to the polytomous logistic regression model except that we have k model equations and one logistic coefficient β_{ij}, for each category/covariate combination. The general

cumulative logistic regression model therefore contains a large number of parameters. A more parsimonious model can be thought of when the logistic coefficients do not depend on *i* and we have only one common parameter β_{ij} for each covariate. Based on this, the cumulative odds are given by

$$Odds\ (Y \leq i = i) = exp(\alpha,)\ exp(\beta_i X_i + \ldots + \beta_m X_m)\ \text{, i=l,...,k} \quad \text{--- (11)}$$

This model suggests that the k odds for each cut-off category i differ only with regard to the intercepts a_l and known as "proportional odds model" (116) as the above model suggests that the odds are proportional. Where Y represents the Hypertension, X_i represents job stress categories and confounding variables, b_i are their coefficients, and 'e', is the random error term. b_0 is an intercept term that is the average value of hypertension for the entire group that would be detected if none of the exposure variables or confounder variables had any effect. The coefficients indicate the amount of change in the hypertension per unit change in the particular category of job stress or confounder compared for higher job stress domains with lower job stress. For example for workers with higher job stress, the odds ratio obtained from this equation represents the odds of getting hypertension for subjects with higher and moderate job stress compared to the participants with lower job stress. Similarly for workers with moderate job stress, the odds ratio represents the odds of getting hypertension for subjects moderate job stress compared to the participants with lower job stress.

We made conscious efforts to detect collinearity, which occurs when certain predictors are highly correlated with each other. The implication of such collinearity is that it is very difficult to separate the effects of these variables statistically, and analyses yield regression coefficients with very large variances so that effect estimates may be very unstable and sometimes inaccurate. Collinearity whenever was detected, the variables were appropriately dealt with by keeping contextually specific variable in the model or based on evidence. (118)

Results

We invited 1369 IT/ITES professionals to participate in the study; the refusal rate was 4.7% (n=64). Among the 1305 professionals who accepted the questionnaire for answering, 171 (13%) didn't return them. Among the people who returned the questionnaire (1134), we found 51 (4.6%) to be ineligible based on the inclusion criteria (duration less than one year). There were 12 subjects with missing data on inclusion criteria who were included for analysis. By treating non-responders as refusals, the refusal rate is 22%. If we exclude non-responders, the refusal rate is 18%. Among the eligible subjects (1071), we conducted the analysis regarding Job stress and Hypertension that included 599 IT professionals and 472 ITES professionals.

Descriptive analysis

Lifestyle determinants: One third of our sample population were ever or current tobacco users (353, 32%), and more than half of them moderately drink alcohol (592, 55%) with very few into drugs (5%). Nearly two thirds of IT/ITES professionals don't perform any type of physical exercise (62%, 625) with an average weight of 71.6 kgs and body mass index 24.49. The average waist circumference is 88.95 cms, hip circumference 98.43 cms and average waist by hip ratio 0.91. (Table.1)

Prevalence of Hypertension*:* The mean SBP (first) reading was 127.28 mm Hg and DBP was 80.34 mm Hg. The average height was 170.9 cms and average leg length was 99.55 cms. The mean age was 28.52 and mean socio economic status was 2.22. (Table-1)

After two readings and according to the JNC-VII classification, (10) the prevalence of pre hypertension (SBP: 120-139 mm HG OR DBP: 80-89 mm HG) was 45.7 %, of stage 1 was 25.43 % and stage 2 was 5 %. (Table.2). By considering binary classification, the prevalence of hypertension was 31% with 26% of IT/ITES professionals in stage.1 and around 5% in stage.2 (severe with SBP more than 160 mm Hg). (Table.2).

The prevalence of pre-hypertension in the age group of 19 -25 Years was 45.9 %, 46.5% in 26 - 30 Years group, 46% in 31-35 years and 32% in the age group of 36- 55 Years. The prevalence of stage-1 hypertension in the age group of 19 -25 Years was **18%, 23%** in 26 -30 Years group, 37% in 31-35 years and 31% in the age group of 36- 55 Years. The prevalence of stage-2 hypertension in the age group of 19 -25 Years was **5%, 3%** in 26 -30 Years group, 8% in 31-35 years and 13% in the age group of 36- 55 Years. (Table-3)

Socio-Demographic characteristics

The study sample comprised 1071 IT/ITES professionals, 65% male and 35% female participants. (M 700, F 371) 74% of the workforce were less than 30 years of age (49% in 26-30 age group 19-25: 266 25%, 31-35:217 20%). (Table.4) 56% of the professionals belonged to the IT industry while the remainder belonged to the ITES industry. Nine percent of the IT/ITES professionals were working at entry level (0-2 years), 33% were in junior level (3-7 years), well educated (648, 77% professional degree or higher), 45% were in middle level management (8-12 years) and 12% were in senior level (13+ years) (Table.4)

More than half of the professionals were well paid (More than ` 30000 / $500: 541, 64%), 1/3rd of them had ever used tobacco (353, 32%), half of them were current alcohol users (592, 55%) and very few were currently into drugs (5%). Two thirds of the professionals do not perform any regular exercise (62%, 625). The proportion of married professionals is 43%. Professionals belonging to upper castes constitute the majority of the study workforce (545, 60%) and are generally well educated (648, 77% professional degree or higher). The workforce is relatively well paid with their monthly income being $1000 or more for 54% of the study participants. Around 36% of the sample had positive family history of hypertension, 4% were already diagnosed with hypertension and 2% with diabetes. (Table.5)

Working conditions

Around 96% of the employees were full time employees and 88% of them had worked for less than 7 years. Approximately 58% of IT/ITES professionals take around 2-7 hours to reach office from their home and 67% of the entire sample people feel stressed about it. Our results indicate that more than 71% of professionals work more than eight hours in a day with 28% of the sample not taking breaks in between work as required. With this, the work would continue as 60% of them receiving even extend answer calls regularly while 32% receive occasionally. (Only 8% of professionals don't answer calls at home). Only 35% of the sample did shift work with 18% of them not receiving any free days or less than one day after night shift. The results also indicate that 20% of the total sample working for more than 8 night shifts per month. (Table.6)

Job stressors

We analyzed the Occupational stress index both as a continuous score (mean= 53.5, Table.1) and used tertiles of scores. The tertiles of OSI were distributed such that 34.5% had low levels of stress as indicated by OSI, 43 % had moderate and 22% high stress levels. As per the results from descriptive analysis: 45% have strict deadlines on daily basis, 28% do not have enough information to do their work, 18% do not get support for facing difficult situations, 18% had to face abuses of power, 21% were blamed for someone else's mistake, 40% had to endure humiliation (comparison with others), 20% of workers had to bear abusive communication, 25% had to face discrimination (mostly based on region, gender, race or caste). While 15% of professionals decide their own schedule, 39% decided with permission of supervisor but had still had some say in it and 17% had absolutely no control over it. (Table.7).

Thirty four percent of professionals had low, 43% had moderate and 22% high stress levels, 45% have strict deadlines on daily basis, 28% do not have enough information to do their work, 18% do not get support for facing difficult situations, 18% had to face abuses of power, 21%

were blamed for someone else's mistake, 20% of workers have to bear abusive communication, 25% have to face discrimination (mostly based on region, gender, race or caste). (Table.7).

Non-stressor Determinants of Hypertension

The stratified distribution of socio-demographic indicators with stages of hypertension is provided in table.8. Among the hypertensives (stage 1 and stage 2), 13% had a family history of high blood pressure while 18.9% had no parent or siblings with hypertension. Other professionals were either normotensives or were pre-hypertensives. Among the professionals who were diagnosed to have high blood pressure, Males constituted 21.5% and females 10.4%, Single, never Married 17.3% and married were 14%. Hypertension in other upper castes was 16% followed by backward castes (5.7%). Barring PhD holders (due to small number), the relation between educational qualifications and hypertension was inverse with 12.9% of hypertensives among post graduates, 9.3% in professional degrees, 8.1% in general degree and 1.6% for pre-degree holders. These percentages do not add up to 100 here because the remaining distribution of normotensives and pre-hypertensives is not described here in the text.

Among the professionals diagnosed with hypertension, most of them were working in middle management positions (14.4%) followed by those in junior positions (10.5%) and around 3% at either entry level or senior management positions. Among the hypertensives, most of them 17% had worked between 2-7 years followed by 11% had worked less than 2 years. The percentage of hypertensives among workers who had completed 7 to 12 years was 3% and in those who worked for more than 13 years was less than 1%. (Table.8)

The odds of getting hypertension for professionals who have worked for 2 to 7 years is 2.2 times higher and for professionals who have worked for less than 2 years is 2.6 times higher compared to professionals who worked for more than 12 years. Conversely, if the total duration

of occupation was more than 13 years, then odds of having hypertension were 62% lower compared to those who had less than 2 years of experience. (Table.9)

Similar to stratified analysis, the crude estimates indicated that the odds of having hypertension are 33% higher if none of the family members were diagnosed with hypertension. Regarding level of educational attainment, compared to persons with pre-degree, the odds of having hypertension for persons with professional degree was 139% higher and for post graduates was 127% higher. (Table.9)

The odds of getting hypertension for those who have used tobacco in their lifetime is 40% higher and current smokers had 50% higher odds compared to those who had never used tobacco. The odds of getting hypertension for those who consume alcohol rarely is 41% lower, for those who consume alcohol occasionally is 28% lower and for those who consume alcohol frequently is 49% lower compared to those who never consume alcohol. (Table.9)

The odds of getting hypertension for people who warm up & stretch sometimes during the course of work was 27% lower and who pause to relax by stopping work for sometime is 24% lower compared to for those who do not adopt these coping mechanisms (Table.10)

Job stressors and Hypertension

The stratified distribution of contextual stress domains with stages of hypertension is provided in table.7. Among the professionals who had hypertension (stage 1 and stage 2), 21.2 % had moderate or higher level of occupational stress (74). Affect was a prominent stressor with 19.1% of professionals who had moderate level or higher emotional stressors having hypertension. Similarly, 17% had moderate or higher level of Time pressure, 19% had moderate or higher Job

Control stressors, 14% had similar degree of income stressors, 14.9% had autonomy stressors, 16% had appreciation related stressors, and 16.4% had work environment related stressors. (Table.11)

The results of the logistic regression estimating total unadjusted prevalence association between contextual stress domains with hypertension are presented in (Table 12.) Participants with moderate stress regarding experience related stress had 34% higher odds of suffering from JNC -VII whereas persons with higher stress regarding this had 12% lower. Participants with moderate stress regarding autonomy had 39% higher odds of suffering from JNC -VII whereas persons with higher stress regarding this had 14% lower. Participants with higher physical environment stress had 45% higher odds of having hypertension. (Table 12)

Keeping 19 to 25 years as the reference group, the odds of getting hypertension for 31- to 35 years old professionals was 48% lower and for 36 to 55 Years was 60% lower. (Table.13)

On adjusting for age, gender, waist by hip circumference, family history of high blood pressure, socio-economic status, marital status, tobacco ever use, regular exercises for at least 20 minutes daily and alcohol use, the results for higher stress for contextual domains were statistically significant for ***autonomy and work environment***, whereas results for other contextual stress domains were not statistically significant. People with moderate autonomy had 40% higher and with high work environment stressors had 48% chances of having hypertension compared to lower level of stress. (Table.14)

Discussion

There is very high prevalence of hypertension in the study population. It is alarming that around 31% of IT/ITES professionals are hypertensive with approximately 5% having malignant levels

of hypertension. South Asians are predisposed to be hypertensive a decade earlier compared the developed countries.(2-4) Our study suggests that hypertension in IT/ITES professionals occurs a decade earlier compared to the rest of India and 2 decades earlier compared to developed countries.(1-4) This suggests that if untreated, these professionals would go on to develop cardiovascular diseases at an early age. The results also indicated that 46% of professionals were in prehypertension. According to the JNC-7 classification, prehypertension is not a disease category but a designation chosen to identify individuals at high risk of developing hypertension. (10) These individuals will have to change their lifestyle to prevent a progressive rise in BP using the recommended lifestyle modifications.(10)

Cardiovascular diseases (CVD) are a major cause of mortality and disease in the Indian subcontinent, causing more than 25% of deaths. It has been predicted that these diseases will increase rapidly in India and this country will be the locale of more than half the cases of heart disease in the world within the next 15 years. High blood pressure is the predominant risk factor for CVD and evidence indicates that there is high prevalence in both urban and rural areas. Indian urban population-based studies using WHO guidelines for diagnosis have shown increasing hypertension among adults aged 20 years from about 5% in the 1960–70s to 11–15% in the late 1990s. (5, 119) There were several studies done in India suggesting increasing trends in the prevalence of hypertension in urban subjects over the last four decades compared to the people in rural areas. (65-68, 120)[19, (61),(34, 63, 64, 121) (5, 122) Our results are in conformity with earlier results in general population but suggest that IT/ITES professionals are at higher risk to get hypertension and are affected a decade earlier compared to earlier available evidence.

The results from this study indicates, that there is higher prevalence of hypertension among professionals in the early years of joining IT/ITES sectors compared to professionals who

worked for more than 12 years. It was seen that that the longer the professionals work, lower is the odds of getting hypertension. It is counterintuitive to have lower prevalence of hypertension with increase in experience in IT/ITES professionals. The reason for this can be that the interplay of cardiovascular risk factors and job stress might result in the IT/ITES professionals getting hypertension in earlier years, as soon as they join the workforce. However in due course of time, it might be possible that the professionals with hypertension leave the workforce. We cannot also rule out the likelihood of survivor bias as the professionals with hypertension might have developed CHD or changed jobs or might have succumbed to death. It might also be possible that workers who prefer to stay back in the organizations might gradually adapt to better coping mechanisms.

Specifically, subjects with autonomy related stress and higher work environment related stresses were found to have higher prevalence of having Hypertension compared to the participants with their corresponding lower levels of stress. The autonomy domain of stress was estimated by calculating the weighted average of responses to questions on "who is in charge of deciding your work schedule?" "Who evaluates your work?" and "Is your work constantly monitored?"

In our study, the autonomy stressor domain comprised information on work schedule, evaluation of work and monitoring of the work. Earlier studies support these findings. (123,124) (110) Our results are in conformity with evidence linking work schedule and hypertension. (125-128) Further, there are results supporting the stressor role of performance monitoring, done either electronically(129) or by supplementary techniques.(130-133) The term *"monitoring"* reflects collective practices of work to note data about functioning of employee and has the potential to create distress in them.(131, 134, 135) Brewer defines evaluation apprehension as extent to which checking of a task

enhances awareness of the performance-reward likelihood for the given task.(136) This can be influenced by perception of workers (135), extent to which suppression occurs (137) and generalized positive or negative feelings about monitoring (138, 139). Evidence indicates that such psychosocial stressors can also affect individuals with prehypertension and accelerate the development of cardiovascular diseases.(140-142)

Occupational stress research has predominantly focused on issues of work environment. This domain elicited responses to questions on encountering dilemmas during work, help received thereafter, assessment of defined way of solving problems at work and its efficiency, knowledge to perform work and comparison to other colleagues at the work place. All the components of this domain have been found to be associated with health impacts in earlier studies. (140-142)

Our results indicate that the odds of getting hypertension for those who have used tobacco in their lifetime was 43% higher compared to those who had never used tobacco. Similar results were obtained for current tobacco users. According to National Family Health Survey-3, (143) tobacco use is fairly common in India, particularly for men, and there are subgroups of the population among whom use of tobacco is particularly common. (143) (144) There is a strong correlation between urbanization and increase in the risk of non-communicable diseases such as cardiovascular disease in Indian subjects. (67, 112)

The odds of getting hypertension for those who consume alcohol in any form (occasional or regular) was lower compared to those who never consume alcohol. It is widely known that light and moderate alcohol intake are associated with decreased risk of incident cardiovascular disease (62, 111, 145, 146) However, due to the possibility of reverse causation due to temporal ambiguity, we cannot make any recommendations regarding this. Hence, this finding has to be taken cautiously given that the professionals also do not exercise but do use tobacco.

Notwithstanding some of the important findings, caution will have to be applied before conclusive inferences can be drawn. This is due to some limitations in the study including selection bias, measurement error and confounding.

Selection Bias: One of the limitations of cross-sectional study such as ours is that a one time study of health related factors is governed by several selection factors. It is important to explore factors that might lead to selection bias and to examine whether this selection bias might have changed our estimation of pre-hypertension and hypertension. The details regarding the selection factors and details are given in methods paper (Flow-chart). (69) The specific reasons for selection factors that might have caused bias and whether these factors might have influenced the estimates to go either upward or downward and are described here.

First, It has to be noted that not all companies were located in the identified IT parks. We conducted the study in confined areas of the IT parks, wherein several companies of IT sector are located. It is possible that there might be other companies that are outside the park and hence could not be in the sampling frame of our study. The core-functions of IT companies is very specifically defined and it is very hard to imagine that companies would differ greatly within Bengaluru merely because they were outside the IT park. Most of the big IT Companies have their office in the vicinity of IT Park. We argue that stress levels in small IT companies might be more compared to larger companies.(147) Hence, by limiting the chances of IT companies to get included, if at all the changes have taken place, might have resulted in under-estimation of job-stress and hypertension. However, we do understand that the bias might have had any direction.

Second, not all companies conduct health check ups or arrange for “health-talks”. We conducted the study by utilizing the opportunities of health camps, health-talks and kiosks placed at places where lunch is served. It is possible that only people that some companies do not conduct health-camps and do not arrange for talks by experts on chosen health topics. However, it is very unlikely that the proportion of such companies is large within IT park. One might expect more cases of occupational stress & Hypertension if there were no health check-ups done at all or if there is greater proportion of professionals who are not aware of hypertension. Hence, we would have only detected greater prevalence of hypertension and occupational stress (cannot predict about this) by inclusion of such companies. Hence, our estimates might still be modest.

Third, not all workers visit health check up camps. It is described that people who are conscious of their health, those with disease or symptoms are the ones who might be more interested to learn more about their healthy behavior. Even if were to assume that all the people who walked into health check-up camps were “health-conscious”, our estimates of pre-hypertension are alarming and indicate that the scenario might be even bad if we were to include people who are not so health conscious. Participation in health check-up camps and attendance at health talks was voluntary. People who volunteered were to seek appointments from HR for these health check-ups. In case of health talks, no confirmation of appointments was needed.

Fourth, not all those who visit health check up camps turn into research kiosk: Among the people who visited health check-up camps, almost every person has gone through kiosk of research as all the kiosks were in serial order and the research kiosk was placed either in last or last but one position. We cannot rule out a very small proportion of professionals who might not have visited the research kiosk at all. We argue that these people might be in hurry to complete their assigned tasks and might be having more job-stress and hypertension compared to the

ones who attended the research kiosk (as they might be confident that they could manage the work schedule even if they get delayed by another 15-20 minutes).

Fifth, not all those who visit research kiosk agree to participate: Out of the people who visited research kiosk, 64 (5.7%) people didn't want to participate in the study. We asked them whether they would at least get their blood pressure measured. All of them cited they didn't have time for it and hence didn't participate. It is possible that these people might either be normal or hypertensive and our estimates might have changed in any direction based on this.

Sixth, not all those who agree to participate actually participate: Among the professionals who agreed to participate (n=1305) but informed that they will return the questionnaire later (n=107), only 56 people returned the questionnaire and were part of the study. Other 51 people didn't return the questionnaire (25 in IT sector and 26 in ITES sector) (professionals who took the questionnaire and informed that they would return either on the same day or next day but didn't return the questionnaire.) It is possible that these people might either be normal or hypertensive and our estimates might have changed in any direction based on this. We assume that health-conscious people would generally have returned back to seek more information on hypertension. Those who didn't return to submit filled questionnaire were either having more work against shorter deadlines (more occupational stress) and who might have also greater chance of either having pre-hypertension or hypertension.

Finally, there is possibility of bias due to Healthy worker effect. Several studies have concluded that *"lower mortality and morbidity in occupational groups is observed" which is termed as Healthy worker effect (148, 149)* (113). There are two possible mechanisms that cause Healthy worker effect namely *better* health profile of subjects responsible for getting into the workforce (Type-1 HWE) and sicker workers getting out of workforce. (Type-2 HWE). Type-1 HWE is

considered to be a confounding variable while type-2 HWE is considered to be selection bias if it is also associated with outcome of interest. Being a cross sectional study, bias from healthy worker survivor effect can be possible.

Measurement error and confounding: OSI doesn't discriminate between missing values and no values. There is a possibility that information was misclassified. We are studying prevalent cases of Hypertension and hence might underestimate the effects of job stress if it truly causes Hypertension but also causes subjects to leave the job. The same bias can occur if instead of terminating the employment, those who are affected by job stress transfer into occupation that do not have much stress. Hence, workers moving out of IT/ITES workforce can explain the negative or no association.

Also, cuff size of the sphygmomanometer relative to the diameter of the arm is crucial. Error can be expected if the cuff size is too small, resulting in overestimation of blood pressure. Using a large, adult sized cuff for all except the skinniest arms can reduce error. (150, 151) BP measurements also are influenced by the position of the arm. Observer bias can occur while measuring BP due to differences in auditory acuity and digit preference. The average BP values recorded by trained persons can vary by 5-10 mm Hg.(152) Other sources of measurement error can be due to difference in rate if cuff inflation and deflation and other technical sources such as mercury columns in different instruments. Hence we used automatic sphygmomanometers to avoid observer bias, provided funding is available.

We followed the method of tertiles to analyze the stress domains and hence some residual confounding might have be left without controlling. We ran the analysis on continuous and categorical boundaries to cross check. The results did not change much.

Finally, no causal inference can be drawn since we cannot establish temporality in the association through our study design.

Summary of findings and recommendations

We found a high prevalence of hypertension in the study population. The hypertensive professionals need to be followed up to prevent cardio vascular diseases (CVD). There is a great opportunity for the primary prevention of (CVD) through creation of awareness among IT/ITES professionals. The message to these professionals should focus on making lifestyle changes and continuously monitor blood pressure. It is important to educate the professionals to engage in habits, which reduce the risk of hypertension such as regular exercises and necessary dietary modifications to prevent the onset of serious, life threatening complications. Further, effective preventive programs will have to be designed to prevent hypertension in high-risk groups in India. The policymakers should be urged to provide resources to pilot intervention programs addressing primary prevention of hypertension.

The positive impacts on health of working professionals can be achieved through working and collaborating with workers and employers. It would be in the best interest of the companies to focus on the long-term sustainable approaches and to urge engage employees to adjust healthy lifestyles to achieve reduction of NCDs. The employers of IT/ITES should realize that small investments made in preventive activities will translate to saving expenses for the company and better health, thereby sustained productivity of their employees.

The association of autonomy and work-environment with hypertension suggests that our results are in conformity with research on social determinants of health. Future research should focus on delineating the exposure and health status contrasts between two or more occupational groups. Attention should be paid towards prospective examination of the variance in induction periods and pathways connecting health outcomes and behaviors. Concurrently, worksite interventions can be piloted that aim at reducing psychosocial aspects of work environment and autonomy domains including professional help on stress-management.

The paucity of research exploring the association between job stressors and hypertension in India necessitates the replication of these results in other occupational groups including IT/ITES professionals. In particular, further exploration is necessary to understand how stress factors are related to overarching social determinants and how this might be related to their health status.

Funding:

The study was supported through NIH/Fogarty International center, Fogarty/UCLA AIDS International Research & Training Program. (*Grant Number:* D43 TW000013) and the Public Health Foundation of India provided partial grant.

Table.1: Descriptive statistics: Continuous variables in the study

Variables	N	Mean	SE	95% C.I
SBP-1st reading	1071	127.3	0.4	(126.5 - 128.2)
DBP-1st reading	1071	80.3	0.4	(79.6 - 81.1)
SBP-2nd reading	763	127.1	0.5	(126.1 - 128.2)
DBP-2nd reading	763	78.7	0.5	(77.9 - 79.7)
Height	1071	170.9	0.2	(170.5 - 171.4)
Weight	1071	71.6	0.4	(71.0 - 72.3)
BMI	1071	24.5	0.1	(24.3 - 24.7)
Waist Circumference	1071	89.0	0.3	(88.4 - 89.6)
Hip Circumference	1071	98.4	0.3	(97.9 - 99)
Waist by Hip Ratio	1071	0.9	0.0	(0.9 - 1.0)
Leg Length	1071	99.6	0.2	(99.1 - 100.1)
Calories	1071	576.5	20.0	(537.4 - 615.8)
Age	1056	28.5	0.1	(28.3 - 28.8)
Socio Economic Status	1071	2.2	0.0	(2.2 - 2.3)
Length of experience*	824	69.1	0.3	(68.5 - 69.8)
Time pressure*	915	67.4	0.3	(66.9 - 68.0)
Shift work*	902	39.6	0.7	(38.3 - 40.9)
Job Control*	959	61.7	0.4	(61.0 - 62.5)
Autonomy *	1013	73.2	0.5	(72.3 - 74.2)
Appreciation*	1007	48.9	0.6	(47.7 - 50.1)
Physical environment*	979	54.0	0.3	(53.4 - 54.6)
Work environment*	957	51.6	0.4	(50.9 - 52.4)
Affect*	992	48.1	0.5	(47.2 - 49.0)

Abbreviations: N:Total sample size, n:sample size in the particular strata %:Percentage; SBP: Systolic Blood Pressure; DBP: Diastolic Blood Pressure; BMI: Body Mass Index; SE: Standard error; CI: Confidence interval

***Contextual stress domains were estimated based on our qualitative study, which have specific questions describing the stressful conditions of the IT/ITES industry collected from the professionals.

Table.2: Prevalence of Hypertension in IT/ITES professionals

Prevalence of Hypertension in the study population

	(N)	Variable	Number in strata	Percentage	Standard error	95% confidence interval
Hypertension- JNC VII classification. (One reading)	1071	**Normal**	243	22.7	1.3	(20.2 - 25.3)
		Pre Hypertension	487	45.5	1.5	(42.5 - 48.5)
		Stage 1	273	25.5	1.3	**(22.9 - 28.2)**
		Stage 2	68	6.4	0.8	**(4.9 - 7.9)**
Hypertension- JNC VII classification. (Two readings)	763	**Normal**	181	23.7	1.5	(20.7 - 26.8)
		Pre Hypertension	349	45.7	1.8	(42.2 - 49.3)
		Stage 1	194	25.4	1.6	**(22.4 - 28.6)**
		Stage 2	39	5.1	0.8	**(3.6 - 6.7)**
Hypertension 1 ***(Binary classification)***	1071	**Normal**	730	68.2	1.4	(65.4 - 71.0)
		Hypertensive	341	31.8	1.4	**(29.1 - 34.7)**
Hypertension 2 ***(Binary classification)***	763	**Normal**	530	69.5	1.7	(66.2 - 72.8)
		Hypertensive	233	30.5	1.7	**(27.3 - 33.9)**

Legend:
IT: Information Technology professionals
ITES: Professionals in Information Technology Enabled Services
JNC VII: Joint National Commission VII
Percentage: Percentage of Hypertension in sample;
SE: Standard error of the percentage;
CI: Confidence interval

Table.3: Distribution of Age groups and prevalence of Hypertension in IT/ITES professionals

Age-group	Normal n (%)	Pre Hypertensive n (%)	Stage 1 n (%)	Stage 2 n (%)	Total n (%)
	Hypertension, JNC VII classification, First reading				
19 to 25 Years	67 (25.2)	122 (45.9)	61 (22.9)	16 (6.0)	266 (24.8)
26 to 30 Years	124 (23.4)	246 (46.5)	132 (25.0)	27 (5.1)	529 (49.4)
31 to 35 Years	43 (19.8)	100 (46.1)	58 (26.7)	16 (7.4)	217 (20.3)
36 to 55 Years	9 (15.3)	19 (32.2)	22 (37.3)	9 (15.3)	59 (5.5)
	Hypertension, JNC VII classification, Second reading				
19 to 25 Years	46 (25.7)	91 (50.8)	33 (18.4)	9 (5.0)	179 (23.5)
26 to 30 Years	94 (24.5)	188 (49.1)	89 (23.2)	12 (3.1)	383 (50.2)
31 to 35 Years	35 (22.4)	51 (32.7)	58 (37.2)	12 (7.7)	156 (20.5)
36 to 55 Years	6 (13.3)	19 (42.2)	14 (31.1)	6 (13.3)	45 (6.0)

N: Total sample size=1071
n: sample size in the particular strata
Percentage: Percentage of Hypertension in sample;

Table.4: Socio-Demographic characteristics of Study population

Variable	(N)	Levels	(n)	%	S. E	95% C.I
Gender	1071	Male	700	65.4	1.5	(62.6 - 68.3)
		Female	371	34.6	1.5	(31.8 - 37.5)
Age	1071	19 to 25 Age	266	24.8	1.0	(23.0 - 28.0)
		26 to 30 Age	529	49.4	2.0	(47.0 - 53.0)
		31 to 35 Age	217	20.3	1.0	(18.0 - 23.0)
		36 to 55 Age	59	5.5	1.0	(5.0 - 7.0)
Marital Status	1069	Married	455	42.6	1.5	(39.6 - 45.6)
		Single, Never Married	599	56.0	1.5	(53.1 - 59.1)
		Single, Divorced	9	0.8	0.3	(0.3 - 1.4)
		Single, Widow	6	0.6	0.2	(0.2 - 1.1)
Caste	1071	Brahmin	159	14.9	1.1	(12.8 - 17.0)
		Upper Caste	486	45.4	1.5	(42.4 - 48.4)
		Backward caste	200	18.7	1.2	(16.4 - 21.1)
		Scheduled caste	32	3.0	0.5	(2.0 - 4.1)
		Scheduled tribe	11	1.0	0.3	(0.5 - 1.7)
		Decline to provide	183	17.1	1.2	(14.9 - 19.4)
Educational qualifications*	840	Pre-Degree	29	3.5	0.6	(2.3 - 4.7)
		General Degree	163	19.4	1.4	(16.8 - 22.1)
		Professional Degree	305	36.3	1.7	(33.1 - 39.6)
		Post Graduate	341	40.6	1.7	(37.3 - 44)
		PhD	2	0.2	0.2	(0.0 - 0.6)
Income per month (post-tax in Indian Rupees)	1071	<10000	23	2.6	0.5	(1.6 - 3.7)
		>10001 and <30000	393	43.8	1.7	(40.6 - 47.1)
		=>30001 and <50000	295	32.9	1.6	(29.9 - 36.0)
		=>50001 per month	186	20.7	1.4	(18.1 - 23.4)
Own a House	1071	Yes	329	31.4	1.4	(28.6 - 34.2)
		No	720	68.6	1.4	(65.9 - 71.5)
Domicile resident of Bangalore	1071	Yes	265	24.7	1.3	(22.2 - 27.4)
		No	720	67.2	1.4	(64.5 - 70.1)
		Others	86	8.0	0.8	(6.4 - 9.7)
Parents or siblings With Hypertension	1071	Yes	384	35.9	1.5	(33.0 - 38.8)
		No	687	64.2	1.5	(61.3 - 67.1)
Already diagnosed with Hypertension	1071	Yes	48	4.5	0.6	(3.3 - 5.8)
		No	1023	95.5	0.6	(94.3 - 96.8)
Already diagnosed with Diabetes Mellitus	1071	Yes	16	1.5	0.4	(0.8 - 2.3)
		No	1055	98.5	0.4	(97.8 - 99.3)

N: Total sample size; n: sample size in the particular strata
Percentage: Percentage of Hypertension in sample;
SE: Standard error of the percentage;
CI: Confidence interval
Educational qualifications: Pre-Degree : PUC, any diplomas without bachelor's degree; General Degree: Any undergraduate degree such as BA, BCom, BBM etc.; Professional Degree: BE, B.Tech; Post Graduate**:** MBA, M.Tech, MCA etc.

Table.5: Descriptive statistics: Confounder distribution in the study

Variable	(N)	Variable	(n)	%	SE	[95% C.I]
Ever Tobacco use	1071	Yes	353	33.0	1.4	(30.2 - 35.8)
Ever Tobacco use	1071	Yes	353	33.0	1.4	(30.2 - 35.8)
		No	718	67.0	1.4	(64.3 - 69.9)
Current Tobacco use	1071	Yes	282	26.3	1.4	(23.7 - 29.0)
		No	789	73.7	1.4	(71.1 - 76.4)
Number of Cigarettes	278	Less than 10 per day	257	92.5	1.6	(89.4 - 95.6)
		11 to 20 per day	18	6.5	1.5	(3.6 - 9.4)
		21 to 30 per day	1	0.4	0.4	(0.0 - 1.1)
		>31 to 150 per day	2	0.7	0.5	(0.0 - 1.8)
Alcohol	1071	Never	459	42.9	1.5	(39.9 - 45.9)
		Rarely	233	21.8	1.3	(19.3 - 24.3)
		Occasionally	315	29.4	1.4	(26.7 - 32.2)
		Frequently	64	6.0	0.7	(4.6 - 7.4)
Frequency Alcohol	600	Daily	30	5.0	0.9	(3.3 - 6.8)
		Weekly Once	122	20.3	1.6	(17.2 - 23.6)
		Weekly twice	70	11.7	1.3	(9.1 - 14.3)
		Monthly	126	21.0	1.7	(17.8 - 24.3)
		Occasionally	252	42.0	2.0	(38.1 - 46.0)
Physical Exercises for 20 Minutes	1020	Yes	395	38.7	1.5	(35.8 - 41.8)
		No	625	61.3	1.5	(58.3 - 64.3)
Physical Exercises for 20 minutes	1013	Yes	379	37.4	1.5	(34.5 - 40.4)
		No	634	62.6	1.5	(59.7 - 65.6)
Exercise at moderate intensity	901	Yes	638	70.8	1.5	(67.9 - 73.8)
		No	263	29.2	1.5	(26.3 - 32.2)
Regular Aerobics	1071	Yes	292	27.3	1.4	(24.6 - 30)
		No	779	72.7	1.4	(70.1 - 75.5)

Legend:
IT: Information Technology professionals
ITES: Professionals in Information Technology Enabled Services
N: Total sample size, n: sample size in the particular strata
%: Percentage;
SE: Standard error of the percentage;
CI: Confidence interval

Table.6: Characteristics of working environment, Hours and Duration of Work

Variable	(N)	Level	(n)	%	SE	95% C.I
Sector of work	1071	I.T industry	599	55.9	1.5	(53.0 - 59.0)
		ITES	472	44.1	1.5	(41.1 - 47.1)
Current level in management	835	Entry level	79	9.5	1.0	(7.5 - 11.5)
		Junior level	274	32.8	1.6	(29.7 - 36.1)
		Middle level	378	45.3	1.7	(41.9 - 48.7)
		Senior level	104	12.5	1.1	(10.3 - 14.7)
Type of work	1055	Full time position	1014	96.1	0.6	(95.0 - 97.3)
		Part time position	41	3.9	0.6	(2.8 - 5.1)
Total work experience	987	0.0 - 2.0 Years	197	20.0	1.3	(17.5 - 22.5)
		2.1 - 7.0 Years	577	58.5	1.6	(55.4 - 61.6)
		7.1 - 12.0 Years	180	18.2	1.2	(15.9 - 20.7)
		13.1 - 28.0 Years	33	3.3	0.6	(2.3 - 4.5)
Time taken to travel to Office	1062	< 1 hours	537	50.6	1.5	(47.6 - 53.6)
		1-2 hours	409	38.5	1.5	(35.6 - 41.5)
		> 6 hours	78	7.3	0.8	(5.8 - 9)
		3-4 hours	38	3.6	0.6	(2.5 - 4.7)
Stress due to Traffic	1053	Yes	702	66.7	1.5	(63.9 - 69.6)
		No	351	33.3	1.5	(30.5 - 36.2)
Working Hours	1004	< = 08.00 hrs	294	29.3	1.4	(26.5 - 32.2)
		08.01 – 10 hrs	598	59.6	1.6	(56.6 - 62.7)
		10.01 – 13 hrs	97	9.7	0.9	(7.9 - 11.5)
		13.01 - 16.30 hrs	15	1.5	0.4	(0.8 - 2.3)
Answer Call at home	1020	Never	83	8.1	0.9	(6.5 - 9.9)
		Rarely	326	32.0	1.5	(29.1 - 34.9)
		Occasionally	387	37.9	1.5	(35.0 - 41.0)
		Frequently	224	22.0	1.3	(19.5 - 24.6)
Taking Breaks	1046	Regularly	255	24.4	1.3	(21.8 - 27.0)
		Occasionally	491	46.9	1.5	(44.0 - 50.0)
		Rarely	261	25.0	1.3	(22.4 - 27.6)
		Never	39	3.7	0.6	(2.6 - 4.9)
Shift work	1052	No	682	64.8	1.5	(62 - 67.8)
		Yes	370	35.2	1.5	(32.3 - 38.1)
Schedule of Night Shifts	982	No Shift Work	682	69.5	1.5	(66.6 - 72.4)
		Fixed Monthly	126	12.8	1.1	(10.8 - 15)
		Fixed Fortnightly	101	10.3	1.0	(8.4 - 12.2)
		Fixed Weekly	38	3.9	0.6	(2.7 - 5.1)
Frequency of Night Shifts	941	Unpredictable,	35	3.6	0.6	(2.5 - 4.8)
		No Shift Work	682	72.5	1.5	(69.7 - 75.4)
		< 7 Nights per Month	80	8.5	0.9	(6.8 - 10.3)
		8 - 14 Nights per Month	80	8.5	0.9	(6.8 - 10.3)
		15 - 30 Nights per Month	99	10.5	1.0	(8.6 - 12.5)
Free Days after Night shifts	938	No Shift Work	682	72.7	1.5	(69.9 - 75.6)
		2 or more free Days	189	20.2	1.3	(17.6 - 22.8)
		1 or less free Day	67	7.1	0.8	(5.5 - 8.8)
Take time off from work	1014	Not at all	135	13.3	1.1	(11.3 - 15.5)
		A Little	336	33.1	1.5	(30.3 - 36.1)
		Somewhat	351	34.6	1.5	(31.7 - 37.6)
		Very Much	192	18.9	1.2	(16.6 - 21.4)
In charge of deciding work schedule	1029	Totally up-to me	156	15.2	1.1	(13.0 - 17.4)
		Flexible.	405	39.4	1.5	(36.4 - 42.4)
		Depends on others.	292	28.4	1.4	(25.7 - 31.2)

		No control	176	17.1	1.2	(14.8 - 19.5)
Work from Home	1051	Regularly	71	6.8	0.8	(5.3 - 8.3)
		Occasionally	213	20.3	1.2	(17.9 - 22.8)
		Rarely	237	22.6	1.3	(20.1 - 25.1)
		Never	530	50.4	1.5	(47.5 - 53.5)

Legend: N: Total sample size, n: sample size in the particular strata; %: Percentage; SE: Standard error of the percentage; CI: Confidence interval

Table.7: Determinants of Stressors at work among IT/ITES professionals

Variable	(N)	Level	(n)	%	95% C.I
Strict deadlines for work	1055	Never	90	8.5	(6.9 - 10.3)
		Rarely	199	18.9	(16.5 - 21.3)
		Occasionally	286	27.1	(24.5 - 29.8)
		Frequently	480	45.5	(42.5 - 48.6)
Have control over speed of work	1051	Absolute control	468	44.5	(41.6 - 47.6)
		Relative control	267	25.4	(22.8 - 28.1)
		Very little control	241	22.9	(20.4 - 25.5)
		No control	75	7.1	(5.6 - 8.7)
Possess adequate information about work	1061	Always.	425	40.1	(37.2 - 43.1)
		Usually	323	30.5	(27.7 - 33.3)
		Some% not.	241	22.7	(20.3 - 25.3)
		Most of the information is unclear	71	6.7	(5.2 - 8.3)
Response to dilemma at work	1039	Can always postpone a decision	266	25.6	(23.0 - 28.3)
		I can usually postpone a decision	278	26.8	(24.1 - 29.5)
		Some% can't postpone the decision.	383	36.9	(34.0 - 39.9)
		Always cannot postpone the decision.	112	10.8	(8.9 - 12.7)
Support during difficult work situations	1056	Yes, I can nearly always count on it.	506	47.9	(44.9 - 51.0)
		Yes, more often than not.	361	34.2	(31.4 - 37.1)
		Can't really count on getting help.	142	13.5	(11.4 - 15.6)
		Rarely or never do I get the help	47	4.5	(3.3 - 5.7)
Knowledge to perform	1062	Yes, I always possess the knowledge	694	65.4	(62.5 - 68.3)
		Yes, more often than not.	238	22.4	(19.9 - 25.0)
		Some% not, but help available	115	10.8	(9.0 - 12.8)
		Never and don't get the help	15	1.4	(0.8 - 2.2)
Monotony and Lack of creative tasks	1048	Not at all.	342	32.6	(29.8 - 35.5)
		Mainly no	377	36.0	(33.1 - 38.9)
		Some tasks are monotonous	262	25.0	(22.4 - 27.7)
		Most tasks are monotonous	67	6.4	(5.0 - 7.9)
Solution to problems at work is done	1001	Frequently	289	28.9	(26.1 - 31.7)
		Occasionally	55	5.5	(4.1 - 7.0)
		Rarely	329	32.9	(30.0 - 35.8)
		Never	328	32.8	(29.9 - 35.7)
Efficiency of solution resolutions	669	Yes	545	81.5	(78.6 - 84.5)
		No	124	18.5	(15.6 - 21.5)
Abuses of Power or Violation or Norms of behavior	1037	Never	492	47.4	(44.5 - 50.5)

		Rarely	362	34.9	(32.1 - 37.9)
		Occasionally	155	15.0	(12.8 - 17.2)
		Frequently	28	2.7	(1.8 - 3.7)
Blamed for someone else's mistakes	1042	Never	445	42.7	(39.7 - 45.8)
		Rarely	378	36.3	(33.4 - 39.3)
		Occasionally	187	18.0	(15.7 - 20.3)
		Frequently	32	3.1	(2.1 - 4.2)
Credit taken by supervisor for the work done by employee	1033	Never	423	41.0	(38.0 - 44.0)
		Yes, Only once	267	25.9	(23.2 - 28.6)
		Yes, twice	66	6.4	(4.9 - 7.9)
		Yes, more than twice	277	26.8	(24.2 - 29.6)
Transparency at workplace	1039	Very transparent	396	38.1	(35.2 - 41.1)
		Transparent, but unclear at %	399	38.4	(35.5 - 41.4)
		Doubtful transparency	184	17.7	(15.4 - 20.1)
		Not transparent at all	60	5.8	(4.4 - 7.2)
Comparison with others (humiliation)	1054	Never	309	29.3	(26.6 - 32.1)
		Rarely	327	31.0	(28.3 - 33.9)
		Occasionally	256	24.3	(21.7 - 26.9)
		Frequently	162	15.4	(13.2 - 17.6)
Involved in escalation at work	1047	Never	330	31.5	(28.7 - 34.4)
		Rarely	373	35.6	(32.8 - 38.6)
		Occasionally	256	24.5	(21.9 - 27.1)
		Frequently	88	8.4	(6.8 - 10.1)
Bear abusive communication	1042	Never	516	49.5	(46.5 - 52.6)
		Rarely	323	31.0	(28.2 - 33.9)
		Occasionally	146	14.0	(12.0 - 16.2)
		Frequently	57	5.5	(4.1 - 6.9)
Discrimination at work	1034	No	770	74.5	(71.9 - 77.2)
		Yes	264	25.5	(22.9 - 28.2)
Factor for Discrimination	301	Gender	62	20.6	(16.1 - 25.2)
		Race	55	18.3	(13.9 - 22.7)
		Caste	22	7.3	(4.4 - 10.3)
		Region from which I belong to	110	36.5	(31.1 - 42.1)
		Others	52	17.3	(13.0 - 21.6)

Legend:

N: Total sample size, n: sample size in the particular strata; %: Percentage; SE: Standard error of the percentage; CI: Confidence interval

Table.8: Description of first reading of Hypertension, (JNC VII criteria) stratified on socio-economic indicators

		Normal			Pre-hypertensive			Stage-1			Stage-2			Total		
		#	%	CI	#	%	CI	#	%	CI	#	%	CI	#	%	CI
Blood Pressure in family	Yes	81	7.6	(6 - 9.2)	164	15.3	(13.2 - 17.5)	102	9.5	(7.8 - 11.3)	37	3.5	(2.4 - 4.6)	384	35.9	(33 - 38.8)
	No	162	15.1	(13 - 17.3)	323	30.2	(27.5 - 33)	171	16.0	(13.8 - 18.2)	31	2.9	(1.9 - 4)	687	64.2	(61.3 - 67.1)
	Total	243	22.7	(20.2 - 25.3)	487	45.5	(42.5 - 48.5)	273	25.5	(22.9 - 28.2)	68	6.4	(4.9 - 7.9)	1071	100	
Gender	Male	146	13.6	(11.6 - 15.7)	324	30.3	(27.5 - 33.1)	184	17.2	(15 - 19.5)	46	4.3	(3.1 - 5.6)	700	65.4	(62.6 - 68.3)
	Female	97	9.1	(7.4 - 10.8)	163	15.2	(13.1 - 17.4)	89	8.3	(6.7 - 10)	22	2.1	(1.3 - 3)	371	34.6	(31.8 - 37.5)
	Total	243	22.7	(20.2 - 25.3)	487	45.5	(42.5 - 48.5)	273	25.5	(22.9 - 28.2)	68	6.4	(4.9 - 7.9)	1071	100	
Marital status	Married	93	8.7	(7.1 - 10.4)	212	19.8	(17.5 - 22.3)	118	11.0	(9.2 - 13)	32	3.0	(2 - 4.1)	455	42.6	(39.6 - 45.6)
	Single, Never Married	145	13.6	(11.6 - 15.7)	269	25.2	(22.6 - 27.8)	149	13.9	(11.9 - 16.1)	36	3.4	(2.3 - 4.5)	599	56.0	(53.1 - 59.1)
	Single, Divorced	3	0.3	(0 - 0.6)	4	0.4	(0.1 - 0.8)	2	0.2	(0 - 0.5)	0		(0 - 0)	9	0.8	(0.3 - 1.4)
	Single, Widow	2	0.2	(0 - 0.5)	1	0.1	(0 - 0.3)	3	0.3	(0 - 0.6)	0		(0 - 0)	6	0.6	(0.2 - 1.1)
	Total	243	22.7	(20.3 - 25.3)	486	45.5	(42.5 - 48.5)	272	25.4	(22.9 - 28.1)	68	6.4	(4.9 - 7.9)	1069	100	
No of Children at home	Less than 4 Years Old	38	12.3	(8.7 - 16.1)	98	31.8	(26.6 - 37.1)	58	18.8	(14.5 - 23.3)	6	2.0	(0.4 - 3.6)	200	64.9	(59.6 - 70.3)
	4 to 12 Years Old	15	4.9	(2.5 - 7.3)	31	10.1	(6.7 - 13.5)	22	7.1	(4.3 - 10.1)	10	3.3	(1.3 - 5.3)	78	25.3	(20.5 - 30.3)
	13 to 18 Years Old	1	0.3	(0 - 1)	4	1.3	(0.1 - 2.6)	2	0.7	(0 - 1.6)	0		(0 - 0)	7	2.3	(0.6 - 4)
	Above 19 Years Old	5	1.6	(0.3 - 3.1)	9	2.9	(1.1 - 4.9)	5	1.6	(0.3 - 3.1)	4	1.3	(0.1 - 2.6)	23	7.5	(4.6 - 10.5)
	Total	59	19.2	(14.8 - 23.6)	142	46.1	(40.6 - 51.8)	87	28.3	(23.2 - 33.4)	20	6.5	(3.8 - 9.3)	308	100	

Caste	Brahmin	37	3.5	(2.4 - 4.6)	78	7.3	(5.8 - 8.9)	35	3.3	(2.3 - 4.4)	9	0.8	(0.3 - 1.4)	159	14.9	(12.8 - 17)
	Other upper castes	103	9.6	(7.9 - 11.4)	212	19.8	(17.5 - 22.2)	142	13.3	(11.3 - 15.3)	29	2.7	(1.8 - 3.7)	486	45.4	(42.4 - 48.4)
	Backward caste	35	3.3	(2.3 - 4.4)	104	9.7	(8 - 11.5)	46	4.3	(3.1 - 5.6)	15	1.4	(0.7 - 2.2)	200	18.7	(16.4 - 21.1)
	Scheduled caste	8	0.8	(0.3 - 1.3)	12	1.1	(0.5 - 1.8)	11	1.0	(0.5 - 1.7)	1	0.1	(0 - 0.3)	32	3.0	(2 - 4.1)
	Scheduled tribe	2	0.2	(0 - 0.5)	6	0.6	(0.2 - 1.1)	3	0.3	(0 - 0.6)	0		(0 - 0)	11	1.0	(0.5 - 1.7)
	Decline to provide	58	5.4	(4.1 - 6.8)	75	7.0	(5.5 - 8.6)	36	3.4	(2.3 - 4.5)	14	1.3	(0.7 - 2)	183	17.1	(14.9 - 19.4)
	Total	243	22.7	(20.2 - 25.3)	487	45.5	(42.5 - 48.5)	273	25.5	(22.9 - 28.2)	68	6.4	(4.9 - 7.9)	1071	100.0	
Education*	Pre-Degree	3	0.4	(0 - 0.8)	13	1.6	(0.8 - 2.4)	8	1.0	(0.3 - 1.7)	5	0.6	(0.1 - 1.2)	29	3.5	(2.3 - 4.7)
	General Degree	39	4.6	(3.3 - 6.1)	56	6.7	(5 - 8.4)	52	6.2	(4.6 - 7.9)	16	1.9	(1 - 2.9)	163	19.4	(16.8 - 22.1)
	Professional Degree	63	7.5	(5.8 - 9.3)	164	19.5	(16.9 - 22.3)	67	8.0	(6.2 - 9.9)	11	1.3	(0.6 - 2.1)	305	36.3	(33.1 - 39.6)
	Post Graduate	87	10.4	(8.3 - 12.5)	146	17.4	(14.9 - 20)	88	10.5	(8.5 - 12.6)	20	2.4	(1.4 - 3.5)	341	40.6	(37.3 - 44)
	PHD	1	0.1	(0 - 0.4)	1	0.1	(0 - 0.4)	0		(0 - 0)	0		(0 - 0)	2	0.2	(0 - 0.6)
	Total	193	23.0	(20.2 - 25.9)	380	45.2	(41.9 - 48.7)	215	25.6	(22.7 - 28.6)	52	6.2	(4.6 - 7.9)	840	100.0	
Own a house	Yes	71	6.8	(5.3 - 8.3)	141	13.4	(11.4 - 15.6)	98	9.3	(7.6 - 11.2)	19	1.8	(1.1 - 2.7)	329	31.4	(28.6 - 34.2)
	No	170	16.2	(14 - 18.5)	337	32.1	(29.3 - 35)	165	15.7	(13.6 - 18)	48	4.6	(3.4 - 5.9)	720	68.6	(65.9 - 71.5)
	Total	241	23.0	(20.5 - 25.6)	478	45.6	(42.6 - 48.6)	263	25.1	(22.5 - 27.7)	67	6.4	(5 - 7.9)	1049	100.0	
Occupation	Entry	24	2.9	(1.8 - 4.1)	29	3.5	(2.3 - 4.8)	23	2.8	(1.7 - 3.9)	3	0.4	(0 - 0.8)	79	9.5	(7.5 - 11.5)
	Junior	68	8.1	(6.3 - 10.1)	118	14.1	(11.8 - 16.5)	63	7.5	(5.8 - 9.4)	25	3.0	(1.9 - 4.2)	274	32.8	(29.7 - 36.1)

	Middle Management	82	9.8	(7.8 - 11.9)	176	21.1	(18.4 - 23.9)	104	12.5	(10.3 - 14.7)	16	1.9	(1 - 2.9)	378	45.3	(41.9 - 48.7)
	Senior Management	21	2.5	(1.5 - 3.6)	54	6.5	(4.8 - 8.2)	24	2.9	(1.8 - 4.1)	5	0.6	(0.1 - 1.2)	104	12.5	(10.3 - 14.7)
	Total	195	23.4	(20.5 - 26.3)	377	45.2	(41.8 - 48.6)	214	25.6	(22.7 - 28.6)	49	5.9	(4.3 - 7.5)	835	100.0	
Work Time	Full time position	232	22.0	(19.5 - 24.5)	456	43.2	(40.3 - 46.3)	261	24.7	(22.2 - 27.4)	65	6.2	(4.8 - 7.7)	1014	96.1	(95 - 97.3)
	Part time position	11	1.0	(0.5 - 1.7)	18	1.7	(1 - 2.5)	9	0.9	(0.3 - 1.5)	3	0.3	(0 - 0.7)	41	3.9	(2.8 - 5.1)
	Total	243	23.0	(20.5 - 25.6)	474	44.9	(42 - 48)	270	25.6	(23 - 28.3)	68	6.5	(5 - 8)	1055	100.0	
Experience in current occupation	13.1 - 28.0 Years	3	0.3	(0 - 0.7)	2	0.2	(0 - 0.5)	6	0.6	(0.2 - 1.1)	3	0.3	(0 - 0.7)	14	1.3	(0.7 - 2.1)
	7.1 - 12.0 Years	17	1.6	(0.9 - 2.4)	29	2.8	(1.8 - 3.8)	24	2.3	(1.4 - 3.2)	6	0.6	(0.2 - 1.1)	76	7.2	(5.7 - 8.8)
	2.1 - 7.0 Years	124	11.8	(9.9 - 13.8)	283	26.8	(24.2 - 29.6)	144	13.7	(11.6 - 15.8)	36	3.4	(2.4 - 4.6)	587	55.6	(52.7 - 58.7)
	0.0 - 2.0 Years	97	9.2	(7.5 - 11)	165	15.6	(13.5 - 17.9)	94	8.9	(7.2 - 10.7)	22	2.1	(1.3 - 3)	378	35.8	(33 - 38.8)
	Total	241	22.8	(20.4 - 25.4)	479	45.4	(42.4 - 48.5)	268	25.4	(22.8 - 28.1)	67	6.4	(4.9 - 7.9)	1055	100.0	
Tobacco Ever Use	Yes	67	6.3	(4.9 - 7.8)	155	14.5	(12.4 - 16.6)	101	9.4	(7.7 - 11.2)	30	2.8	(1.9 - 3.8)	353	33.0	(30.2 - 35.8)
	No	176	16.4	(14.3 - 18.7)	332	31.0	(28.3 - 33.8)	172	16.1	(13.9 - 18.3)	38	3.6	(2.5 - 4.7)	718	67.0	(64.3 - 69.9)
	Total	243	22.7	(20.2 - 25.3)	487	45.5	(42.5 - 48.5)	273	25.5	(22.9 - 28.2)	68	6.4	(4.9 - 7.9)	1071	100.0	
Current Tobacco Use	Yes	53	5.0	(3.7 - 6.3)	121	11.3	(9.4 - 13.2)	84	7.8	(6.3 - 9.5)	24	2.2	(1.4 - 3.2)	282	26.3	(23.7 - 29)
	No	190	17.7	(15.5 - 20.1)	366	34.2	(31.4 - 37.1)	189	17.7	(15.4 - 20)	44	4.1	(3 - 5.3)	789	73.7	(71.1 - 76.4)
	Total	243	22.7	(20.2 - 25.3)	487	45.5	(42.5 - 48.5)	273	25.5	(22.9 - 28.2)	68	6.4	(4.9 - 7.9)	1071	100.0	
Alcohol	Never	124	11.6	(9.7 - 13.5)	216	20.2	(17.8 - 22.6)	93	8.7	(7 - 10.4)	26	2.4	(1.6 - 3.4)	459	42.9	(39.9 - 45.9)

	Rarely	43	4.0	(2.9 - 5.2)	99	9.2	(7.6 - 11)	76	7.1	(5.6 - 8.7)	15	1.4	(0.7 - 2.2)	233	21.8	(19.3 - 24.3)
	Occasionally	66	6.2	(4.8 - 7.7)	144	13.5	(11.4 - 15.5)	85	7.9	(6.4 - 9.6)	20	1.9	(1.1 - 2.7)	315	29.4	(26.7 - 32.2)
	Frequently	10	0.9	(0.4 - 1.6)	28	2.6	(1.7 - 3.6)	19	1.8	(1 - 2.6)	7	0.7	(0.2 - 1.2)	64	6.0	(4.6 - 7.4)
	Total	243	22.7	(20.2 - 25.3)	487	45.5	(42.5 - 48.5)	273	25.5	(22.9 - 28.2)	68	6.4	(4.9 - 7.9)	1071	100.0	
Exercise for 20 mins	Yes	84	8.2	(6.6 - 10)	181	17.8	(15.4 - 20.1)	106	10.4	(8.6 - 12.3)	24	2.4	(1.5 - 3.3)	395	38.7	(35.8 - 41.8)
	No	146	14.3	(12.2 - 16.5)	284	27.8	(25.1 - 30.6)	154	15.1	(12.9 - 17.3)	41	4.0	(2.9 - 5.3)	625	61.3	(58.3 - 64.3)
	Total	230	22.6	(20 - 25.2)	465	45.6	(42.6 - 48.7)	260	25.5	(22.9 - 28.2)	65	6.4	(4.9 - 7.9)	1020	100.0	
Regular Exercise	Yes	85	8.4	(6.7 - 10.2)	177	17.5	(15.2 - 19.9)	94	9.3	(7.5 - 11.1)	23	2.3	(1.4 - 3.2)	379	37.4	(34.5 - 40.4)
	No	144	14.2	(12.1 - 16.4)	287	28.3	(25.6 - 31.2)	162	16.0	(13.8 - 18.3)	41	4.1	(2.9 - 5.3)	634	62.6	(59.7 - 65.6)
	Total	229	22.6	(20.1 - 25.2)	464	45.8	(42.8 - 48.9)	256	25.3	(22.6 - 28)	64	6.3	(4.9 - 7.9)	1013	100.0	

Legend:
#: Sample size in the corresponding strata
%: Percentage of Hypertension in sample;
SE: Standard error of the percentage;
CI: Confidence interval
*Educational qualifications: Pre-Degree : PUC, any diplomas without bachelor's degree; General Degree: Any undergraduate degree such as BA, BCom, BBM etc; Professional Degree: BE, B.Tech; Post Graduate**:** MBA, M.Tech, MCA etc

Table.9: Crude Prevalence Estimates of Hypertension with socio-demographic indicators

Name of the variable	Levels	Odds Ratio	95% Confidence interval	P Value
Sector	**IT**	**Reference**		
	ITES	1.07	(0.86 - 1.34)	0.57
Income per month	<10000	Reference		
	>10001 and <30000	1.30	(0.6 - 2.83)	0.51
	=>30001 and <50000	1.06	(0.49 - 2.31)	0.90
	=>50001 per month	0.85	(0.39 - 1.89)	0.69
Blood Pressure in the family members	Yes	Reference		
	No	**1.33**	**(1.06 - 1.68)**	**0.02**
Diagnosed blood pressure earlier	Yes	Reference		
	No	**11.08**	**(6.28 - 19.56)**	**<.0001**
Gender	Male	Reference		
	Female	1.23	(0.97 - 1.55)	0.09
Marital Status	Married	Reference		
	Single, Never Married	1.17	(0.93 - 1.46)	0.20
	Single, Divorced	1.89	(0.56 - 6.44)	0.32
	Single, Widow	0.96	(0.22 - 4.22)	0.95
No of Children at home	Less than 4 Years Old	Reference		
	4 to 12 Years Old	0.70	(0.43 - 1.14)	0.16
	13 to 18 Years Old	1.01	(0.25 - 4.1)	0.99
	Above 19 Years Old	0.73	(0.33 - 1.63)	0.45
Caste	Brahmin	Reference		
	Other upper castes	0.80	(0.57 - 1.11)	0.17
	Backward caste	0.81	(0.55 - 1.19)	0.27
	Scheduled caste	0.85	(0.42 - 1.71)	0.64
	Scheduled tribe	0.95	(0.31 - 2.95)	0.93
	Decline to provide	1.23	(0.83 - 1.82)	0.31
Education	Pre-Degree *	Reference		
	General Degree **	1.61	(0.78 - 3.32)	0.21
	Professional Degree ***	**2.39**	**(1.18 - 4.82)**	**0.02**
	Post Graduate ****	**2.27**	**(1.13 - 4.56)**	**0.03**
	PHD	8.79	(0.55 - 142.29)	0.13
Own a house	Yes	Reference		
	No	1.20	(0.95 - 1.53)	0.14
Occupation	Entry	Reference		
	Junior	0.84	(0.53 - 1.34)	0.46
	Middle Management	0.83	(0.53 - 1.31)	0.42
	Senior Management	0.88	(0.51 - 1.5)	0.63
Work Time	Full time position	Reference		
	Part time position	1.17	(0.66 - 2.08)	0.61
Duration of current occupation	13.1 - 28.0 Years	Reference		
	7.1 - 12.0 Years	2.60	(0.91 - 7.43)	0.08
	2.1 - 7.0 Years	**3.22**	**(1.21 - 8.54)**	**0.02**
	0.0 - 2.0 Years	**3.59**	**(1.34 - 9.6)**	**0.02**
Total duration	0.0 - 2.0 Years	Reference		
	2.1 - 7.0 Years	0.99	(0.74 - 1.34)	0.95
	7.1 - 12.0 Years	0.77	(0.53 - 1.11)	0.16
	13.1 - 28.0 Years	**0.38**	**(0.2 - 0.75)**	**0.01**
Tobacco Ever Use	Yes	Reference		
	No	**1.43**	**(1.13 - 1.81)**	**0.01**
Current Tobacco Use	Yes	Reference		
	No	**1.45**	**(1.13 - 1.87)**	**0.01**
Alcohol	Never	Reference		
	Rarely	**0.59**	**(0.44 - 0.79)**	**0.01**
	Occasionally	**0.72**	**(0.55 - 0.94)**	**0.02**
	Frequently	**0.51**	**(0.31 - 0.82)**	**0.01**
Exercise for 20 mins	Yes	Reference		
	No	1.09	(0.87 - 1.38)	0.48

Table.10: Crude Prevalence Estimates of Hypertension with coping mechanisms

Stress domain	Levels	Odds Ratio	95% Confidence Interval	P Value
Help to handle heavy object	Almost Always	Reference		
	Some %	0.70	(0.49 - 1.01)	0.06
	Almost Never	0.75	(0.52 - 1.09)	0.13
Modified posture	Almost Always	Reference		
	Some %	0.86	(0.66 - 1.12)	0.26
	Almost Never	0.96	(0.68 - 1.34)	0.79
Use different parts of body	Almost Always	Reference		
	Some %	0.82	(0.58 - 1.17)	0.27
	Almost Never	0.76	(0.54 - 1.08)	0.13
Warm up & stretch	Almost Always	Reference		
	Some %	**0.73**	**(0.55 - 0.98)**	**0.04**
	Almost Never	0.81	(0.59 - 1.11)	0.19
Pause regularly	Almost Always	Reference		
	Some %	0.78	(0.59 - 1.05)	0.10
	Almost Never	0.88	(0.63 - 1.23)	0.44
Adjust height	Almost Always	Reference		
	Some %	1.03	(0.8 - 1.33)	0.85
	Almost Never	1.02	(0.74 - 1.41)	0.92
Change Techniques	Almost Always	Reference		
	Some %	0.85	(0.64 - 1.13)	0.25
	Almost Never	0.83	(0.6 - 1.16)	0.27
Stop Working	Almost Always	Reference		
	Some %	**0.76**	**(0.58 - 1)**	**0.05**
	Almost Never	0.84	(0.61 - 1.15)	0.27

Table.11: Hypertension, (First reading, JNC VII criteria) stratified on contextual stress factors

		Normal			Pre-Hypertensive			Stage-1			Stage-2				Total		
		#	%	CI	#	%	CI	#	%	CI	#	%	SE	CI	#	%	CI
OSI	Low	80	7.5	(5.9 - 9.1)	176	16.4	(14.3 - 18.7)	93	8.7	(7 - 10.4)	21	2.0	0.4	(1.2 - 2.8)	370	34.6	(31.7 - 37.4)
	Moderate	99	9.2	(7.6 - 11)	217	20.3	(17.9 - 22.7)	122	11.4	(9.5 - 13.3)	27	2.5	0.5	(1.6 - 3.5)	465	43.4	(40.5 - 46.4)
	High	64	6.0	(4.6 - 7.4)	94	8.8	(7.1 - 10.5)	58	5.4	(4.1 - 6.8)	20	1.9	0.4	(1.1 - 2.7)	236	22.0	(19.6 - 24.6)
	Total	243	22.7	(20.2 - 25.3)	487	45.5	(42.5 - 48.5)	273	25.5	(22.9 - 28.2)	68	6.4	0.8	(4.9 - 7.9)	1071	100.0	
Time pressure	Low	142	13.3	(11.3 - 15.3)	263	24.6	(22 - 27.2)	123	11.5	(9.6 - 13.4)	36	3.4	0.6	(2.3 - 4.5)	564	52.7	(49.7 - 55.7)
	Moderate	73	6.8	(5.4 - 8.4)	173	16.2	(14 - 18.4)	116	10.8	(9 - 12.7)	20	1.9	0.4	(1.1 - 2.7)	382	35.7	(32.8 - 38.6)
	High	28	2.6	(1.7 - 3.6)	51	4.8	(3.5 - 6.1)	34	3.2	(2.2 - 4.3)	12	1.1	0.3	(0.5 - 1.8)	125	11.7	(9.8 - 13.6)
	Total	243	22.7	(20.2 - 25.3)	487	45.5	(42.5 - 48.5)	273	25.5	(22.9 - 28.2)	68	6.4	0.8	(4.9 - 7.9)	1071	100.0	
Length of experience	Low	188	17.6	(15.3 - 19.9)	376	35.1	(32.3 - 38)	223	20.8	(18.4 - 23.3)	58	5.4	0.7	(4.1 - 6.8)	845	78.9	(76.5 - 81.4)
	Moderate	51	4.8	(3.5 - 6.1)	95	8.9	(7.2 - 10.6)	43	4.0	(2.9 - 5.2)	8	0.8	0.3	(0.3 - 1.3)	197	18.4	(16.1 - 20.8)
	High	4	0.4	(0.1 - 0.8)	16	1.5	(0.8 - 2.3)	7	0.7	(0.2 - 1.2)	2	0.2	0.1	(0 - 0.5)	29	2.7	(1.8 - 3.7)
	Total	243	22.7	(20.2 - 25.3)	487	45.5	(42.5 - 48.5)	273	25.5	(22.9 - 28.2)	68	6.4	0.8	(4.9 - 7.9)	1071	100.0	
Shift work	Low	202	18.9	(16.6 - 21.3)	379	35.4	(32.6 - 38.3)	215	20.1	(17.7 - 22.5)	55	5.1	0.7	(3.9 - 6.5)	851	79.5	(77.1 - 81.9)
	Moderate	2	0.2	(0 - 0.5)	6	0.6	(0.2 - 1.1)	6	0.6	(0.2 - 1.1)	1	0.1	0.1	(0 - 0.3)	15	1.4	(0.7 - 2.2)
	High	39	3.6	(2.6 - 4.8)	102	9.5	(7.8 - 11.3)	52	4.9	(3.6 - 6.2)	12	1.1	0.3	(0.5 - 1.8)	205	19.1	(16.8 - 21.6)
	Total	243	22.7	(20.2 - 25.3)	487	45.5	(42.5 - 48.5)	273	25.5	(22.9 - 28.2)	68	6.4	0.8	(4.9 - 7.9)	1071	100.0	
Job Control	Low	86	8.0	(6.4 - 9.7)	205	19.1	(16.8 - 21.6)	114	10.6	(8.8 - 12.5)	25	2.3	0.5	(1.5 - 3.3)	430	40.2	(37.3 - 43.1)
	Moderate	113	10.6	(8.8 - 12.4)	217	20.3	(17.9 - 22.7)	122	11.4	(9.5 - 13.3)	31	2.9	0.5	(1.9 - 4)	483	45.1	(42.2 - 48.1)
	High	44	4.1	(3 - 5.3)	65	6.1	(4.7 - 7.6)	37	3.5	(2.4 - 4.6)	12	1.1	0.3	(0.5 - 1.8)	158	14.8	(12.7 - 16.9)
	Total	243	22.7	(20.2 - 25.3)	487	45.5	(42.5 - 48.5)	273	25.5	(22.9 - 28.2)	68	6.4	0.8	(4.9 - 7.9)	1071	100.0	
Income	Low	123	11.5	(9.6 - 13.4)	257	24.0	(21.5 - 26.6)	148	13.8	(11.8 - 15.9)	43	4.0	0.6	(2.9 - 5.2)	571	53.3	(50.4 - 56.4)
	Moderate	83	7.8	(6.2 - 9.4)	170	15.9	(13.7 - 18.1)	81	7.6	(6 - 9.2)	23	2.2	0.4	(1.3 - 3.1)	357	33.3	(30.6 - 36.2)
	High	37	3.5	(2.4 - 4.6)	60	5.6	(4.3 - 7)	44	4.1	(3 - 5.3)	2	0.2	0.1	(0 - 0.5)	143	13.4	(11.4 - 15.4)
	Total	243	22.7	(20.2 - 25.3)	487	45.5	(42.5 - 48.5)	273	25.5	(22.9 - 28.2)	68	6.4	0.8	(4.9 - 7.9)	1071	100.0	
Autonomy	Low	104	9.7	(8 - 11.5)	228	21.3	(18.9 - 23.8)	152	14.2	(12.1 - 16.3)	29	2.7	0.5	(1.8 - 3.7)	513	47.9	(45 - 50.9)
	Moderate	121	11.3	(9.4 - 13.2)	223	20.8	(18.4 - 23.3)	97	9.1	(7.4 - 10.8)	29	2.7	0.5	(1.8 - 3.7)	470	43.9	(41 - 46.9)
	High	18	1.7	(1 - 2.5)	36	3.4	(2.3 - 4.5)	24	2.2	(1.4 - 3.2)	10	0.9	0.3	(0.4 - 1.6)	88	8.2	(6.6 - 9.9)
	Total	243	22.7	(20.2 - 25.3)	487	45.5	(42.5 - 48.5)	273	25.5	(22.9 - 28.2)	68	6.4	0.8	(4.9 - 7.9)	1071	100.0	
Appreciation	Low	123	11.5	(9.6 - 13.4)	258	24.1	(21.6 - 26.7)	132	12.3	(10.4 - 14.3)	35	3.3	0.5	(2.3 - 4.4)	548	51.2	(48.2 - 54.2)
	Moderate	75	7.0	(5.5 - 8.6)	154	14.4	(12.3 - 16.5)	93	8.7	(7 - 10.4)	20	1.9	0.4	(1.1 - 2.7)	342	31.9	(29.2 - 34.8)
	High	45	4.2	(3 - 5.5)	75	7.0	(5.5 - 8.6)	48	4.5	(3.3 - 5.8)	13	1.2	0.3	(0.6 - 1.9)	181	16.9	(14.7 - 19.2)
	Total	243	22.7	(20.2 - 25.3)	487	45.5	(42.5 - 48.5)	273	25.5	(22.9 - 28.2)	68	6.4	0.8	(4.9 - 7.9)	1071	100.0	
Physical environment	Low	150	14.0	(12 - 16.1)	308	28.8	(26.1 - 31.5)	184	17.2	(15 - 19.5)	42	3.9	0.6	(2.8 - 5.1)	684	63.9	(61 - 66.8)
	Moderate	53	5.0	(3.7 - 6.3)	116	10.8	(9 - 12.7)	61	5.7	(4.4 - 7.1)	19	1.8	0.4	(1 - 2.6)	249	23.3	(20.8 - 25.8)
	High	40	3.7	(2.6 - 4.9)	63	5.9	(4.5 - 7.3)	28	2.6	(1.7 - 3.6)	7	0.7	0.3	(0.2 - 1.2)	138	12.9	(10.9 - 14.9)
	Total	243	22.7	(20.2 - 25.3)	487	45.5	(42.5 - 48.5)	273	25.5	(22.9 - 28.2)	68	6.4	0.8	(4.9 - 7.9)	1071	100.0	
Work environment	Low	108	10.1	(8.3 - 11.9)	226	21.1	(18.7 - 23.6)	136	12.7	(10.8 - 14.7)	30	2.8	0.5	(1.9 - 3.8)	500	46.7	(43.7 - 49.7)

		Normal			Pre-Hypertensive			Stage-1			Stage-2				Total		
		#	%	CI	#	%	CI	#	%	CI	#	%	SE	CI	#	%	CI
	Moderate	84	7.8	(6.3 - 9.5)	184	17.2	(15 - 19.5)	94	8.8	(7.1 - 10.5)	17	1.6	0.4	(0.9 - 2.4)	379	35.4	(32.6 - 38.3)
	High	51	4.8	(3.5 - 6.1)	77	7.2	(5.7 - 8.8)	43	4.0	(2.9 - 5.2)	21	2.0	0.4	(1.2 - 2.8)	192	17.9	(15.7 - 20.3)
	Total	243	22.7	(20.2 - 25.3)	487	45.5	(42.5 - 48.5)	273	25.5	(22.9 - 28.2)	68	6.4	0.8	(4.9 - 7.9)	1071	100.0	
Affect	Low	94	8.8	(7.1 - 10.5)	230	21.5	(19.1 - 24)	114	10.6	(8.8 - 12.5)	23	2.2	0.4	(1.3 - 3.1)	461	43.0	(40.1 - 46.1)
	Moderate	84	7.8	(6.3 - 9.5)	171	16.0	(13.8 - 18.2)	108	10.1	(8.3 - 11.9)	25	2.3	0.5	(1.5 - 3.3)	388	36.2	(33.4 - 39.2)
	High	65	6.1	(4.7 - 7.6)	86	8.0	(6.4 - 9.7)	51	4.8	(3.5 - 6.1)	20	1.9	0.4	(1.1 - 2.7)	222	20.7	(18.3 - 23.2)
	Total	243	22.7	(20.2 - 25.3)	487	45.5	(42.5 - 48.5)	273	25.5	(22.9 - 28.2)	68	6.4	0.8	(4.9 - 7.9)	1071	100.0	

#: Sample size in the corresponding strata
%: Percentage of Hypertension in sample;
SE: Standard error of the percentage;
CI: Confidence interval

Table.12: Crude estimates of Hypertension with contextual stress domains

Stress domain	Levels	Odds Ratio	95% Confidence interval	P Value
Occupational Stress Index	Low	Reference		
	Moderate	0.97	(0.75 - 1.24)	0.77
	High	1.05	(0.78 - 1.42)	0.77
Time related stress factors	Low	Reference		
	Moderate	**0.74**	**(0.58 - 0.94)**	**0.02**
	High	0.73	(0.51 - 1.05)	0.09
Duration related stress factors	Low	Reference		
	Moderate	**1.34**	**(1.01 - 1.79)**	**0.05**
	High	0.88	(0.45 - 1.74)	0.71
Shift related stress factors	Low	Reference		
	Moderate	0.56	(0.22 - 1.43)	0.23
	High	0.92	(0.69 - 1.22)	0.54
Control related stress factors	Low	Reference		
	Moderate	1.10	(0.86 - 1.39)	0.48
	High	1.23	(0.88 - 1.72)	0.25
Income related stress factors	Low	Reference		
	Moderate	1.17	(0.92 - 1.5)	0.21
	High	1.22	(0.87 - 1.72)	0.26
Autonomy related stress factors	Low	Reference		
	Moderate	**1.39**	**(1.1 - 1.76)**	**0.01**
	High	0.86	(0.57 - 1.31)	0.48
Appreciation related stress factors	Low	Reference		
	Moderate	0.94	(0.73 - 1.2)	0.60
	High	0.97	(0.72 - 1.33)	0.85
Physical related stress factors	Low	Reference		
	Moderate	1.00	(0.76 - 1.3)	0.95
	High	**1.45**	**(1.03 - 2.03)**	**0.04**
Work environment related stress factors	Low	Reference		
	Moderate	1.13	(0.89 - 1.45)	0.34
	High	1.06	(0.78 - 1.45)	0.71
Emotional related stress factors	Low	Reference		
	Moderate	0.91	(0.71 - 1.17)	0.45
	High	1.13	(0.84 - 1.52)	0.44

***Contextual stress domains were estimated based on our qualitative study, which contained Specific questions describing the stressful conditions of the IT/ITES industry collected from the IT/ITES Professionals**

Table.13: Crude estimates for age groups with Hypertension in IT/ITES professionals

Age-group	Normal n (%)	Pre Hypertensive n (%)	Stage 1 n (%)	Stage 2 n (%)	Total n (%)	OR	95% CI	P Value
	Hypertension, JNC VII classification, First reading							
19 to 25 Years	67 (25.19)	122 (45.86)	61 (22.93)	16 (6.02)	266 (24.84)	Ref	-	-
26 to 30 Years	124 (23.44)	246 (46.5)	132 (24.95)	27 (5.1)	529 (49.39)	0.94	(0.72 - 1.24)	0.67
31 to 35 Years	43 (19.82)	100 (46.08)	58 (26.73)	16 (7.37)	217 (20.26)	0.77	(0.55 - 1.07)	0.12
36 to 55 Years	9 (15.25)	19 (32.2)	22 (37.29)	9 (15.25)	59 (5.51)	0.38	**(0.23 - 0.65)**	**0.00**
	Hypertension, JNC VII classification, Second reading							
19 to 25 Years	46 (25.7)	91 (50.84)	33 (18.44)	9 (5.03)	179 (23.46)	Ref	-	-
26 to 30 Years	94 (24.54)	188 (49.09)	89 (23.24)	12 (3.13)	383 (50.2)	0.92	(0.67 - 1.29)	0.64
31 to 35 Years	35 (22.44)	51 (32.69)	58 (37.18)	12 (7.69)	156 (20.45)	0.52	**(0.35 - 0.77)**	**0.00**
36 to 55 Years	6 (13.33)	19 (42.22)	14 (31.11)	6 (13.33)	45 (5.9)	0.40	**(0.22 - 0.73)**	**0.00**

Table.14: Adjusted Estimates of Hypertension (JNC VII, 2nd readings) with contextual domains of Job Stress

Variable	Levels	OR	95% CI	P Value
Occupational Stress Index	1	1.01	(1 - 1.03)	0.17
Occupational Stress Index (tertiles)	Low	Reference		
	Moderate	1.02	(0.75 - 1.4)	0.90
	High	1.16	(0.8 - 1.69)	0.44
Time related stress factors	Low	Reference		
	Moderate	0.92	(0.68 - 1.24)	0.57
	High	0.81	(0.54 - 1.25)	0.34
Duration related stress factors	Low	Reference		
	Moderate	1.19	(0.85 - 1.68)	0.32
	High	0.56	(0.27 - 1.16)	0.11
Shift related stress factors	Low	Reference		
	Moderate	1.29	(0.44 - 3.76)	0.65
	High	0.90	(0.64 - 1.29)	0.57
Income related stress factors	Low	Reference		
	Moderate	0.99	(0.74 - 1.34)	0.94
	High	1.29	(0.84 - 1.99)	0.25
Autonomy related stress factors	Low	Reference		
	Moderate	**1.40**	**(1.06 - 1.87)**	**0.02**
	High	1.11	(0.67 - 1.86)	0.68
Appreciation related stress factors	Low	Reference		
	Moderate	1.06	(0.78 - 1.44)	0.72
	High	1.06	(0.73 - 1.56)	0.75
Work environment related stress factors	Low	Reference		
	Moderate	1.31	(0.97 - 1.77)	0.09
	High	**1.48**	**(1.02 - 2.17)**	**0.04**
Control related stress factors	Low	Reference		
	Moderate	1.05	(0.78 - 1.43)	0.74
	High	1.11	(0.74 - 1.68)	0.61
Emotional related stress factors	Low	Reference		
	Moderate	1.12	(0.83 - 1.53)	0.47
	High	1.10	(0.77 - 1.58)	0.63

#Adjusted for age, gender, waist by hip circumference, family history of high blood pressure, socio-economic status, marital status, tobacco ever use, regular exercises for at least 20 minutes daily and alcohol use.

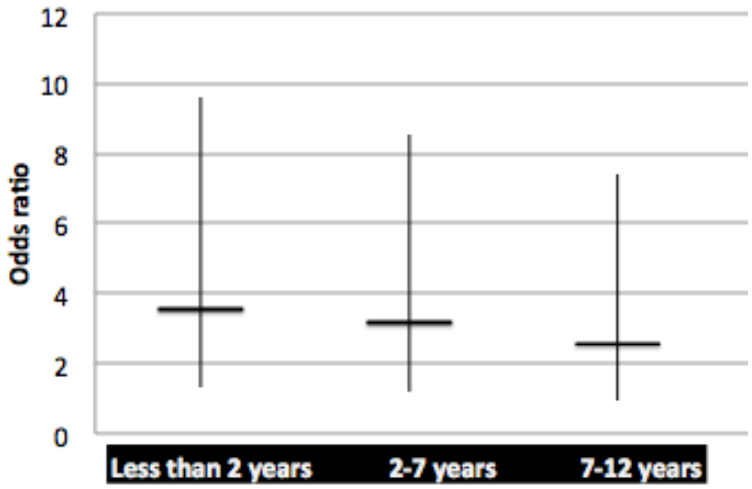

Fig.2: Diagram depicting OR of Hypertension with number of years of work

References:

1. Reddy KS. India Wakes Up to the Threat of Cardiovascular Diseases. Journal of the American College of Cardiology. 2007:j.jacc.2007.04.097.
2. Yusuf S, Reddy S, Ôunpuu S, Anand S. Global Burden of Cardiovascular Diseases. Circulation. 2001 November 27, 2001;104(22):2746-53.
3. Ezzati M, Hoorn SV, Rodgers A, Lopez AD, Mathers CD, Murray C. Estimates of global and regional potential health gains from reducing multiple major risk factors. Lancet. 2003;362(9380):271.
4. Murray CJL, Lopez AD. Global mortality, disability, and the contribution of risk factors: Global Burden of Disease Study. The Lancet. 1997;349(9063):1436-42.
5. Kearney PM, Whelton M, Reynolds K, Muntner P, Whelton PK, He J. Global burden of hypertension: analysis of worldwide data. The Lancet. 2005;365(9455):217-23.
6. Levenson JW, Skerrett PJ, Gaziano JM. Reducing the global burden of cardiovascular disease: the role of risk factors. Preventive cardiology. 2002;5(4):188-99.
7. Pearson TA. Cardiovascular disease in developing countries: myths, realities, and opportunities. Cardiovascular Drugs and Therapy. 1999;13(2):95-104.
8. Organization WH. Global health risks: mortality and burden of disease attributable to selected major risks. 2009. World Health Organization: Geneva. 2010.
9. Whitworth J. 2003 World Health Organization (WHO)/International Society of Hypertension (ISH) statement on management of hypertension. Journal of hypertension. 2003;21(11):1983.
10. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL, et al. Seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure. Hypertension. 2003;42(6):1206-52.
11. Williams B, Poulter NR, Brown MJ, Davis M, McInnes GT, Potter JF, et al. British Hypertension Society guidelines for hypertension management 2004 (BHS-IV): summary. Bmj. 2004;328(7440):634-40.
12. Brown IJ, Tzoulaki I, Candeias V, Elliott P. Salt intakes around the world: implications for public health. International journal of epidemiology. 2009;38(3):791-813.
13. Seedat Y. Hypertension in developing nations in sub-Saharan Africa. Journal of Human Hypertension. 2000;14(10-11):739.
14. Singh R, Suh I, Singh V, Chaithiraphan S, Laothavorn P, Sy R, et al. Hypertension and stroke in Asia: prevalence, control and strategies in developing countries for prevention. Journal of Human Hypertension. 2000;14(10-11):749.
15. Hernandez-Hernandez R, Armas-Padilla M, Armas-Hernandez M, Velasco M. Hypertension and cardiovascular health in Venezuela and Latin American countries. Journal of Human Hypertension. 2000;14:S2.
16. Reddy KS, Yusuf S. Emerging epidemic of cardiovascular disease in developing countries. Circulation. 1998;97(6):596-601.
17. Reddy KS, Katan MB. Diet, nutrition and the prevention of hypertension and cardiovascular diseases. Public Health Nutrition. 2004;7(1A; SPI):167-86.
18. Reddy KS. Heart Beat. HEARTBEAT. 2005.
19. He FJ, MacGregor GA. How Far Should Salt Intake Be Reduced? Hypertension. 2003 December 1, 2003;42(6):1093-9.
20. Staessen J, Bulpitt CJ, Fagard R, Joossens JV, Lijnen P, Amery A. Salt intake and blood pressure in the general population: a controlled intervention trial in two towns. J Hypertens. 1988;6(12):965-73.
21. He FJ, MacGregor GA. Reducing Population Salt Intake Worldwide: From Evidence to Implementation. Progress in cardiovascular diseases. 2010;52(5):363-82.

22. Vartiainen E, Puska P, Jousilahti P, Korhonen HJ, Tuomilehto J, Nissinen A. Twenty-year trends in coronary risk factors in north Karelia and in other areas of Finland. International journal of epidemiology. 1994;23(3):495-504.
23. Pekka P, Pirjo P, Ulla U. Part III. Can we turn back the clock or modify the adverse dynamics? Programme and policy issues. Public Health Nutrition. 2002;5(1a):245-51.
24. Karppanen H, Mervaala E. Sodium intake and hypertension. Progress in cardiovascular diseases. 2006;49(2):59-75.
25. Babu G, Detels R. Prioritizing Social Actions And Involving Community For Prevention Of The Non-Communicable Diseases. The Internet Journal of Epidemiology. 2011;9(2).
26. Yusuf S, Reddy S, Ounpuu S, Anand S. Global burden of cardiovascular diseases: Part II: variations in cardiovascular disease by specific ethnic groups and geographic regions and prevention strategies. Circulation. 2001;104(23):2855.
27. Albright CL, Winkleby MA, Ragland DR, Fisher J, Syme SL. Job strain and prevalence of hypertension in a biracial population of urban bus drivers. American journal of public health. 1992;82(7):984-9.
28. Alfredsson L, Hammar N, Fransson E, de Faire U, Hallqvist J, Knutsson A, et al. Job strain and major risk factors for coronary heart disease among employed males and females in a Swedish study on work, lipids and fibrinogen. Scandinavian Journal of Work, Environment & Health. 2002;28(4):238-48.
29. Alves MGdM, Chor D, Faerstein E, Werneck GL, Lopes CS. Job strain and hypertension in women: Estudo Pro-Saude (Pro-Health Study)
Estresse no trabalho e hipertensao arterial em mulheres no Estudo Pro-Saude. Revista de Saude Publica. 2009;43(5):883-6.
30. Amick BC, Kawachi I, Coakley EH, Lerner D, Levine S, Colditz GA. Relationship of job strain and iso-strain to health status in a cohort of women in the United States. Scand J Work Environ Health. 1998;24(1):54-61.
31. Armario P, Del Rey R, Martin-Baranera M, Almendros M, Ceresuela L, Pardell H. Blood pressure reactivity to mental stress task as a determinant of sustained hypertension after 5 years of follow-up. Journal of Human Hypertension. 2003;17(3):181-6.
32. Backé E-M, Seidler A, Latza U, Rossnagel K, Schumann B. The role of psychosocial stress at work for the development of cardiovascular diseases: a systematic review. International archives of occupational and environmental health. 2012;85(1):67-79.
33. Belkic K, Nedic O. Workplace Stressors and Lifestyle-Related Cancer Risk Factors among Female Physicians: Assessment Using the Occupational Stress Index. Journal of Occupational Health. 2007;49(1):61-71.
34. Belkic K, Schnall P, Landsbergis P, Baker D. The workplace and cardiovascular health: conclusions and thoughts for a future agenda. Occup Med. 2000 20000225;15(1):-321.
35. Bourbonnais R, Comeau M, Vezina M. Job strain and evolution of mental health among nurses. J Occup Health Psychol. [10.1037/1076-8998.4.2.95]. 1999;4(2):95-107.
36. Caplan RP. Stress, anxiety, and depression in hospital consultants, general practitioners, and senior health service managers. Bmj. 1994;309(6964):1261-3.
37. Carroll D, Smith GD, Sheffield D, Shipley MJ, Marmot MG. Pressor reactions to psychological stress and prediction of future blood pressure: data from the Whitehall II study. Bmj. 1995;310(6982):771-5.
38. Curtis AB, James SA, Raghunathan TE, Alcser KH. Job strain and blood pressure in African Americans: the Pitt County Study. American journal of public health. 1997 1997/08/01;87(8):1297-302.
39. Folkow B, Schmidt T, Uvn√§s-Moberg K, Henry JP. Stress, health and the social environment: James P. Henry's ethologic approach to medicine, reflected by recent research in animals and man: in memory of a great 20th century physiologist: Blackwell Science; 1997.

40. Frommer MS, Edye BV, Mandryk JA, Grammeno GL, Berry G, Ferguson DA. Systolic blood pressure in relation to occupation and perceived work stress. Scandinavian Journal of Work, Environment & Health. 1986;12(5):476-85.
41. Guimont C, Brisson C, Dagenais GR, Milot A, V√©zina M, M√¢sse BÆ, et al. Effects of Job Strain on Blood Pressure: A Prospective Study of Male and Female White-Collar Workers. American journal of public health. 2006 2006/08/01;96(8):1436-43.
42. Hammar N, Alfredsson L, Johnson JV. Job strain, social support at work, and incidence of myocardial infarction. Occupational and Environmental Medicine. 1998;55(8):548-53.
43. House JS, Strecher V, Metzner HL, Robbins CA. Occupational Stress and Health Among Men and Women in the Tecumseh Community Health Study. Journal of Health and Social Behavior. 1986;27(1):62-77.
44. Kamran T, Muhammad A, Abdus S, Muhammad L, Nazish A, Samra M, et al. Hypertension in relation to obesity, smoking, stress, family history, age and marital status among human population of Multan, Pakistan. Journal of Medical Sciences(Pakistan). 2004;4(1):30-5.
45. Karasek R, Baker D, Marxer F, Ahlbom A, Theorell T. Job decision latitude, job demands, and cardiovascular disease: a prospective study of Swedish men. Am J Public Health. 1981;71(7):694-705.
46. Karasek R, Theorell T. Healthy work: Stress, productivity, and the reconstruction of working life. 1990.
47. Karasek. RA, Russell, Theorell T. Physiology of stress and regeneration in job related cardiovascular illness. Journal of Human Stress. 1982;8(1):29-42.
48. Kawakami N, Tsutsumi A, Haratani T, Kobayashi F, Ishizaki M, Hayashi T, et al. Job strain, worksite support, and nutrient intake among employed Japanese men and women. J Epidemiol. [10.2188/jea.16.79]. 2006;16:79-89.
49. Landsbergis PA, Schnall PL, Warren K, Pickering TG, et al. Association between ambulatory blood pressure and alternative formulations of job strain. Scandinavian Journal of Work, Environment & Health. 1994;20(5):349-63.
50. Markovitz J, Matthews K, Whooley M, Lewis C, Greenlund K. Increases in job strain are associated with incident hypertension in the CARDIA study. Annals of Behavioral Medicine. 2004;28(1):4-9.
51. Niedhammer I, Goldberg M, Leclerc A, Bugel I, David S. Psychosocial work environment and cardiovascular risk factors in an occupational cohort in France. J Epidemiol Community Health. 1998;52:93-100.
52. Schnall PL, Pieper C, Schwartz JE, Karasek RA, Schlussel Y, Devereux RB, et al. The relationship between'job strain,'workplace diastolic blood pressure, and left ventricular mass index. JAMA: the journal of the American Medical Association. 1990;263(14):1929-35.
53. Schnall PL, Schwartz JE, Landsbergis PA, Warren K, Pickering TG. A longitudinal study of job strain and ambulatory blood pressure: results from a three-year follow-up. Psychosom Med. 1998 19990303;60(6):-706.
54. Karasek R TT. Healthy Work. . New York: Basic Books.; 1990.
55. Siegrist J. Adverse health effects of high-effort/low-reward conditions. Journal of Occupational Health Psychology. 1996;1(1):27-41.
56. Michael J. SMITHI FTC, Ben-Tzion KARSH. Occupational Stress in Human Computer Interaction. Industrial Health 1999;37:157-73.
57. Raymond S. Foreign assistance in an aging world. Foreign Affairs. 2003:91-105.
58. Bloom DE, Canning D, Sevilla J. The demographic dividend: a new perspective on the economic consequences of population change: Rand Corp; 2003.
59. Jiang LH, Beals J, Whitesell NR, Roubideaux Y, Manson SM. Health-related quality of life and help seeking among American Indians with diabetes and hypertension. Quality of Life Research. 2009;18(6):709-18.

60. Kesavachandran C, Rastogi S, Das M, Khan AM. Working conditions and health among employees at information technology-enabled services: A review of current evidence. Indian Journal of Medical Sciences. 2006;60(7):300.
61. Singh J. Price of Success. The Tribue, Spectrum. 2007 Oct 14 2007, .
62. Upadhya C. Controlling offshore knowledge workers: Power and agency in India's software outsourcing industry. New Technology, Work and Employment. [10.1111/j.1468-005X.2008.00215.x]. 2009;24(1):2-18.
63. Belkic K. The Forebrain: Central stress mechanisms and Cardiovascular Responses. 2000.
64. Belkic K SC, Theorell T, Cizinsky S. Work Stressors and Cardiovascular Risk Assessment for Clinical Practice. Part I. : National Institute for Psychosocial Factors and Health, Section for Stress Research; 1995.
65. Gupta R. Burden of coronary heart disease in India. 2005.
66. Gupta R, Gupta VP, Sarna M, Bhatnagar S, Thanvi J, Sharma V, et al. Prevalence of coronary heart disease and risk factors in an urban Indian population: Jaipur Heart Watch-2. Indian heart journal. 2002;54(1):59-66.
67. Padmavati S. Epidemiology of Cardiovascular Disease in India: I. Rheumatic Heart Disease. Circulation. 1962;25(4):703-10.
68. Steyaert J, Gould N. Social Work and the Changing Face of the Digital Divide. British Journal of Social Work. 2009;39(4):740-53.
69. Giridhara R Babu RD. Chapter.2. Methods of IT/ITES study in Bengaluru, India [Papers]. Los Angeles: University of California Los Angeles; 2012.
70. National Association of Software and Service Companies N. The IT-BPO Sector in India : Strategic Review 20122012.
71. Patton MQ. Qualitative research and evaluation methods: Sage Publications, Inc; 2002.
72. Kemper EA, Teddlie C. Mandated Site-Based Management in Texas: Exploring Implementation in Urban High Schools. Teaching and Change. 2000;7(2):172-200.
73. Teddlie C, Yu F. Mixed methods sampling. Journal of Mixed Methods Research. 2007;1(1):77-100.
74. Esposito A, Ferrucci R, Romano L, Nigro E, Lettieri M, Barile A. Health status of women at work: work risks and living conditions. G Ital Med Lav Ergon. 2007 20080415;29(3 Suppl):-391.
75. Noronha E, D'Cruz P. Engaging the professional: organising call centre agents in India. Industrial Relations Journal. 2009;40(3):215-34.
76. Srivastava M. Anxiety, Stress and Satisfaction among Professionals in Manufacturing and Service Organizations. Vision: The Journal of Business Perspective. 2011;15(3):219-29.
77. Hirschfeld K. IT Professionals Forums in India: Organisation at a Crossroads. Union Network International, Nyon. 2005.
78. Xu W, Yu H, Gao W, Guo L, Zeng L, Zhao Y. When Job Stress Threatens Chinese Workers: Combination of Job Stress Models Can Improve the Risk Estimation for Coronary Heart Disease—the BADCAR Study. Journal of Occupational and Environmental Medicine. 2011;53(7):771.
79. Rosenström T, Hintsanen M, Jokela M, Keltikangas-Järvinen L, Kivimäki M, Juonala M, et al. Change in job strain and progression of atherosclerosis: The Cardiovascular Risk in Young Finns study. Journal of Occupational Health Psychology. 2011;16(1):139.
80. Szerencsi K, van Amelsvoort L, Viechtbauer W, Mohren DCL, Prins MH, Kant I. The association between study characteristics and outcome in the relation between job stress and cardiovascular disease–a multilevel meta-regression analysis. Scandinavian journal of work, environment & health. 2012.
81. Peter R, Alfredsson L, Hammar N, Siegrist J, Theorell T, Westerholm P. High effort, low reward, and cardiovascular risk factors in employed Swedish men and women: baseline results from the WOLF Study. Journal of Epidemiology and Community Health. 1998;52(9):540-7.

82. Koenig W, Sund M, Fröhlich M, Fischer HG, Löwel H, Döring A, et al. C-reactive protein, a sensitive marker of inflammation, predicts future risk of coronary heart disease in initially healthy middle-aged men: results from the MONICA (Monitoring Trends and Determinants in Cardiovascular Disease) Augsburg Cohort Study, 1984 to 1992. Circulation. 1999;99(2):237-42.
83. Cesana G, Ferrario M, Sega R, Milesi C, De Vito G, Mancia G, et al. Job strain and ambulatory blood pressure levels in a population-based employed sample of men from northern Italy. Scandinavian Journal of Work, Environment & Health. 1996;22(4):294-305.
84. Van Brabant JM. Economic reforms in centrally planned economies and their impact on the global economy: United Nations; 1990.
85. Belkic K, Savic C. The occupational stress index--An approach derived from cognitive ergonomics applicable to clinical practice. Scandinavian Journal of Work, Environment & Health. 2008;34(6):169.
86. Belkic K. Occupational Stress Index: An introduction. Scan J Work Environ Health. 2000:73-86.
87. Belkic K. The occupational stress index: an approach derived from cognitive ergonomics and brain research for clinical practice: Cambridge International Science Pub.; 2003.
88. Giridhara R Babu RD. Chapter.3. A Qualitative study about work-environment of software professional in Bengaluru, India [Papers]. Los Angeles: University of California Los Angeles; 2012.
89. Schnall P, Belkic K, Landsbergis P, Baker D. Point estimates of blood pressure at the worksite. Occupational Medicine: State-of-the-Art Reviews. 2000;15(1):203-8.
90. Pickering TG, Hall JE, Appel LJ, Falkner BE, Graves J, Hill MN, et al. Recommendations for blood pressure measurement in humans and experimental animals. Circulation. 2005;111(5):697-716.
91. Ezzati M, Hoorn SV, Rodgers A, Lopez AD, Mathers CD, Murray CJ, et al. Estimates of global and regional potential health gains from reducing multiple major risk factors. Lancet. 2003;362(9380):271-80.
92. Gunnell D. Commentary: Can adult anthropometry be used as a 'biomarker'for prenatal and childhood exposures? International journal of epidemiology. 2002;31(2):390-4.
93. Wardle J, Gibson E. Impact of stress on diet: processes and implications. 2002.
94. Selye H. Stress and physical activity. McGill Journal of Education/Revue des sciences de l'éducation de McGill. 1976;11(001).
95. Taylor AH, Biddle S, Fox K, Boutcher S. Physical activity, anxiety, and stress. Physical activity and psychological well-being. 2001:10-45.
96. Clark G, Sakai S, Merrill R, Flack V, McCreary C. Cross-Correlation Between Stress, Pain, Physical Activity, and Temporalis Muscl EMG in Tension-Type Headache. Cephalalgia. 1995;15(6):511-8.
97. Caplan RD, Cobb S, French JR. Relationships of cessation of smoking with job stress, personality, and social support. Journal of Applied Psychology. 1975;60(2):211.
98. Westman M, Eden D, Shirom A. Job stress, cigarette smoking and cessation: the conditioning effects of peer support. Social Science & Medicine. 1985;20(6):637-44.
99. Kunz-Ebrecht SR, Kirschbaum C, Steptoe A. Work stress, socioeconomic status and neuroendocrine activation over the working day. Social Science & Medicine. 2004;58(8):1523-30.
100. Steptoe A, Kunz-Ebrecht S, Owen N, Feldman PJ, Rumley A, Lowe GDO, et al. Influence of socioeconomic status and job control on plasma fibrinogen responses to acute mental stress. Psychosomatic Medicine. 2003;65(1):137-44.
101. Cooper ML, Russell M, Frone MR. Work stress and alcohol effects: A test of stress-induced drinking. Journal of Health and Social Behavior. 1990:260-76.
102. Brady KT, Sonne SC. The role of stress in alcohol use, alcoholism treatment, and relapse. Alcohol Research and Health. 1999;23(4):263-71.

103.Frone MR. Work stress and alcohol use. Alcohol Res Health. 1999;23(4).
104.Zhu JL, Hjollund NH, Andersen AMN, Olsen J. Shift work, job stress, and late fetal loss: The National Birth Cohort in Denmark. Journal of occupational and environmental medicine. 2004;46(11):1144.
105.Tenkanen L, Sjöblom T, Kalimo R, Alikoski T, Härmä M. Shift work, occupation and coronary heart disease over 6 years of follow-up in the Helsinki Heart Study. Scandinavian Journal of Work, Environment & Health. 1997;23(4):257-85.
106.Boggild H, Knutsson A. Shift work, risk factors and cardiovascular disease. Scand J Work Environ Health. 1999;25(2):85-99.
107.Coffey LC, Skipper Jr JK, Jung FD. Nurses and shift work: effects on job performance and job–related stress. Journal of Advanced Nursing. 1988;13(2):245-54.
108.Kornitzer M, Kittel F. How does stress exert its effects--smoking, diet and obesity, physical activity? Postgraduate medical journal. 1986;62(729):695-6.
109.Yusuf S, Hawken S, √îunpuu S, Dans T, Avezum A, Lanas F, et al. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. The Lancet. 2004;364(9438):937-52.
110.LaRocco JM, House JS, French Jr JRP. Social support, occupational stress, and health. Journal of Health and Social Behavior. 1980:202-18.
111.Kitamura A, Iso H, Sankai T, Naito Y, Sato S, Kiyama M, et al. Alcohol intake and premature coronary heart disease in urban Japanese men. American Journal of Epidemiology. 1998;147(1):59-65.
112.Gupta R. Burden of coronary heart disease in India. Indian Heart J. 2005 20060308;57(6):-638.
113.Gupta A, Gupta R, Sarna M, Rastogi S, Gupta VP, Kothari K. Prevalence of diabetes, impaired fasting glucose and insulin resistance syndrome in an urban Indian population. Diabetes Research and Clinical Practice. 2003;61(1):69-76.
114.Institute S. SAS software: version 9.1. SAS Institute Cary, NC; 2002.
115.Rothman KJ, Greenland S, Lash TL. Modern epidemiology. Philadelphia: Lippincott Williams & Wilkins; 2008.
116.McCullagh P. Regression models for ordinal data. Journal of the royal statistical society Series B (Methodological). 1980:109-42.
117.Altman DG. Statistics in medical journals: developments in the 1980s. Statistics in medicine. 1991;10(12):1897-913.
118.Afifi AA, Clark V, May S. Computer-aided multivariate analysis: CRC Press; 2004.
119.Lawes C, Hoorn SV, Rodgers A. Global burden of blood-pressure-related disease, 2001. The Lancet. 2001;371(9623):1513-8.
120.Kristensen TS. Cardiovascular diseases and the work environment: A critical review of the epidemiologic literature on nonchemical factors. Scandinavian Journal of Work, Environment & Health; Scandinavian Journal of Work, Environment & Health. 1989.
121.Snehalatha C, Ramachandran A. Cardiovascular risk factors in the normoglycaemic Asian-Indian population—influence of urbanisation. Diabetologia. 2009;52(4):596-9.
122.Beaglehole R, Bonita R, Horton R, Adams C, Alleyne G, Asaria P, et al. Priority actions for the non-communicable disease crisis. The Lancet. 2011.
123.Karasek R, Gardell B, Lindell J. Work and non–work correlates of illness and behaviour in male and female Swedish white collar workers. Journal of Organizational Behavior. 1987;8(3):187-207.
124.Quick J, Barab J, Fielding J, Hurrell Jr J, Ivancevich J, Mangelsdorff A, et al. Occupational mental health promotion: A prevention agenda based on education and treatment. American Journal of Health Promotion. 1992;7(1):37-44.

125.Sakata K, Suwazono Y, Harada H, Okubo Y, Kobayashi E, Nogawa K. The relationship between shift work and the onset of hypertension in male Japanese workers. Journal of occupational and environmental medicine. 2003;45(9):1002.
126.Oishi M, Suwazono Y, Sakata K, Okubo Y, Harada H, Kobayashi E, et al. A longitudinal study on the relationship between shift work and the progression of hypertension in male Japanese workers. Journal of hypertension. 2005;23(12):2173.
127.Uchiyama S, Kurasawa T, Sekizawa T, Nakatsuka H. Job strain and risk of cardiovascular events in treated hypertensive Japanese workers: hypertension follow-up group study. Journal of Occupational Health. 2005;47(2):102.
128.Furlan R, Barbic F, Piazza S, Tinelli M, Seghizzi P, Malliani A. Modifications of cardiac autonomic profile associated with a shift schedule of work. Circulation. 2000;102(16):1912-6.
129.Smith MJ, Carayon P, Sanders KJ, Lim SY, LeGrande D. Employee stress and health complaints in jobs with and without electronic performance monitoring. Applied Ergonomics. 1992;23(1):17-27.
130.Carayon P. Effect of electronic performance monitoring on job design and worker stress: Review of the literature and conceptual model. Human Factors: The Journal of the Human Factors and Ergonomics Society. 1993;35(3):385-95.
131.Aiello JR, Kolb KJ. Electronic performance monitoring and social context: Impact on productivity and stress. Journal of Applied Psychology. 1995;80(3):339-53.
132.Bond CF, Titus LJ. Social facilitation: A meta-analysis of 241 studies. Psychological Bulletin; Psychological Bulletin. 1983;94(2):265.
133.Snydersmith MA, Cacioppo JT. Parsing complex social factors to determine component effects: I. Autonomic activity and reactivity as a function of human association. Journal of Social and Clinical Psychology. 1992;11(3):263-78.
134.Komaki JL, Zlotnick S, Jensen M. Development of an operant-based taxonomy and observational index of supervisory behavior. Journal of Applied Psychology. 1986;71(2):260.
135.Niehoff BP, Moorman RH. Justice as a mediator of the relationship between methods of monitoring and organizational citizenship behavior. Academy of Management journal. 1993:527-56.
136.Brewer N. The Effects of Monitoring Individual and Group Performance on the Distribution of Effort Across Tasks1. Journal of Applied Social Psychology. 1995;25(9):760-77.
137.Rosenberg RS. The workplace on the verge of the 21st century. Journal of Business Ethics. 1999;22(1):3-14.
138.Chalykoff J, Kochan TA. COMPUTER‚ÄêAIDED MONITORING: ITS INFLUENCE ON EMPLOYEE JOB SATISFACTION AND TURNOVER. Personnel Psychology. 1989;42(4):807-34.
139.Kidwell RE, Bennett N. Employee reactions to electronic control systems. Group & Organization Management. 1994;19(2):203-18.
140.Winegarden C. From “prehypertension” to hypertension? Additional evidence. Annals of epidemiology. 2005;15(9):720-5.
141.Steptoe A, Brydon L. Psychosocial factors and coronary heart disease: the role of psychoneuroimmunological processes. Psychoneuroimmunology Fourth Edition. 2007:945-74.
142.Player MS, King DE, Mainous III AG, Geesey ME. Psychosocial factors and progression from prehypertension to hypertension or coronary heart disease. The Annals of Family Medicine. 2007;5(5):403-11.
143.Sciences IIfP. National Family Health Survey (NFHS-3), 2005-06: India: International Institute for Population Sciences; 2007.
144.Gupta R. Trends in hypertension epidemiology in India. Journal of Human Hypertension. 2004;18(2):73-8.

145.Mukamal KJ, Conigrave KM, Mittleman MA, Camargo Jr CA, Stampfer MJ, Willett WC, et al. Roles of drinking pattern and type of alcohol consumed in coronary heart disease in men. New England Journal of Medicine. 2003;348(2):109-18.
146.Iso H, Kitamura A, Shimamoto T, Sankai T, Naito Y, Sato S, et al. Alcohol intake and the risk of cardiovascular disease in middle-aged Japanese men. Stroke. 1995;26(5):767-73.
147.Fuller CJ, Narasimhan H. Information technology professionals and the new-rich middle class in Chennai (Madras). Modern Asian Studies. 2007;41(1):121-50.
148.Ogle W. Letter to the Registrar-General on the mortality in the registration districts of England and Wales during the ten years 1871-80. Supplement to the 45th Annual Report of the Registrar General of Births, Deaths, and Marriages. England, p xxiii. 1885.
149.Fox AJ, Collier P. Low mortality rates in industrial cohort studies due to selection for work and survival in the industry. British journal of preventive & social medicine. 1976;30(4):225-30.
150.Reinders A, Jones CR, Cuckson AC, Shennan AH. The Maxi Stabil 3: validation of an aneroid device according to a modified British Hypertension Society protocol. Blood pressure monitoring. 2003;8(2):83.
151.Dorigatti F, Bonso E, Zanier A, Palatini P. Validation of Heine Gamma G7 (G5) and XXL-LF aneroid devices for blood pressure measurement. Blood pressure monitoring. 2007;12(1):29.
152.Eilertsen E, Humerfelt S. The observer variation in the measurement of arterial blood pressure. Acta Medica Scandinavica. 1968;184(1−6):145-57.

Chapter.5. Determinants of sexual behaviour and their association with occupational stress among IT/ITES professionals of Bengaluru, India

Abstract

Objective: There are several studies reporting spread of HIV/AIDS and other sexually transmitted diseases (STDs) in India and their association with high-risk sexual activities. Little information has been available about sexual behavior in specialized occupational groups such as IT/ITES professionals in India. Studies identifying high-risk sexual behaviors are needed to formulate effective prevention programs.

Methods: A cross-sectional study was done to estimate occupational stress and its association with high-risk sexual behavior using a mixed sampling method. The study was anonymous and confidentiality was assured to volunteers. Participants completed a self-administered questionnaire on high-risk sexual behaviors including sexual intercourse with irregular partners and multiple partners, paying for sexual intercourse and not using condoms.

Results: In total, 1071 subjects completed the questionnaire. The proportion of IT/ITES workers who had irregular sexual partners was 8% (out of 884) and multiple partners was 5% (out of 914). Among the 964 workers who answered the question, only 4% reported having paid for sex in the last 3 months. Among 619 participants who responded to the condom usage question, 74.3% reported not using a condom during their last vaginal intercourse with their wife/husband/regular partner. Regression estimates indicated that workers with high physical stressors had 6 times higher odds of having paid for sex in last 3 months, and those with moderate level of income related stress had 1.5 times higher likelihood of not using condom during the last sexual intercourse with their wife/husband/regular partner.

Conclusions: There is scope for starting prevention programs among young professionals in the IT/ITES sector to mitigate their possible risk behaviors. As a first step towards this, improving awareness in promoting safe sex practices and promoting knowledge in alleviating high-risk behaviors in IT/ITES might be useful.

Chapter.5. Determinants of sexual behaviour and their association with occupational stress among IT/ITES professionals of Bengaluru, India

Introduction

Targeted intervention programs to prevent the transmission of Human Immunodeficiency Virus (HIV) among high-risk groups such as female sex workers (FSWs) and men who have sex with men (MSM) have been scaled up considerably over the past few years in India. (1, 2) In addition to this, the National AIDS Control Program in India has also been expanded to target clients of Female Sex Workers (FSWs). (2) The HIV epidemic in India has undergone many changes since the diagnosis of the first case in 1986. The epidemic is now gradually spreading into the general population and how much this spread has already taken place is difficult to assess accurately due to the lack of systematic HIV estimation methodology involving the general population of India. Unlike sex workers and attendees of the clinics for sexually transmitted infections (STI), different occupational groups have not yet been targeted for HIV risk reduction programs in India. In order to reduce the risk of HIV among these occupational groups, it is very important to understand the patterns of their sexual behaviour. As sexual contact with their husbands is considered to be the most important risk factor for most married Indian women, having husbands residing away from home for months due to occupational requirements may also be associated with increased risk for the transmission of HIV to their wives. (3-6) Although commercial sex workers and health care workers are considered to be at higher risk of HIV acquisition, the risks for other occupational groups remain understudied. Workers in different Occupations will be affected heterogeneously and the estimation of the risk of HIV acquisition of these groups requires detailed study of the sexual behavior patterns of them.

Liu et al (7) suggest that in the US, an HIV-infected worker would cost an employer $37,320 for

asymptomatic individuals and $US 50,374 for symptomatic individuals per person-year in 2002. The authors mention that costs to businesses are mostly due to higher costs for insurance premiums, welfare benefits, less productivity, new recruitment and training, and downsized economies and labor markets. (7). Rosen et al write in their review that “It is evident that AIDS has raised both risks and costs of doing business in South Africa, but the threat it poses to companies in other developing countries like China and India has so far been ignored” (8). It is evident that identifying high risk behavioural patterns in specific occupational groups and planning HIV prevention programs targeting those groups based on those risk behavior patterns may be the most cost-effective way for dealing with the threat of HIV in terms of improvement and sustenance of the productivity of the working sector. Data on HIV prevention costs from the "Prevent AIDS: Network for Cost-Effectiveness Analysis" (PANCEA) project in five low and middle-income countries including India suggests that unit costs for prevention programs would decrease with increasing scale across a wide range of service types. (9, 10)

The actual prevalence of other STIs might also vary across occupations, as some groups may be at higher risk than others. In India, evidence suggests that jobs with high mobility are likely to be at high risk. Long distance truck drivers and their assistants, apart from being at higher risk, are also found to have important roles in the transmission of HIV. (11-13) Results of a study involving workers of various private sectors in Karnataka (10) did show that workers engaged in mining, garment/textile, sugar, construction/infrastructure, and fishing industries were at high-risk of HIV acquisition. A study on the sexual behavior of garment/textile workers in the southern Indian state of Tamil Nadu has also documented risky behavior among them.(14) In a study conducted among 995 men workers, aged 15-24 years from a knit city in south India, the results indicated that higher income and having more girl friends were associated with greater likelihood for engaging in risky sexual behaviors. (15) In a study involving 3008 men recruited from 11 cities across Indonesia in 2009, the potential for HIV/AIDS transmission was found to vary

across occupational groups. (16) Higher HIV prevalence in comparison with other occupational groups have been documented among the workers of the mining sector in South Africa (17-19) and sugar sector in Malawi (20) and South Africa. (21)Similarly, fishermen have been considered a high-risk group for HIV, based on studies from Goa in India (22), Uganda (23) and Tanzania. (24, 25). It is important to note that not many studies have targeted professional workers and those who do specialized work such as software professionals.

In the year 2012, the approximate number of professionals employed directly in the Information Technology (IT) and Information Technology Enabled Services (ITES) in India was expected to reach 2.8 million. In 1998, these two sectors contributed 1.2 per cent of the national GDP of India and in 2012 it is estimated to have reached 7.5 per cent. The share of total Indian exports held by these two sectors increased from less than 4 per cent in the 1998 financial year to about 25 per cent in 2012 financial year (26) The majority of the employees in ITES sector are young undergraduates from low to middle income families who earn around $200-$400 per month. Among the employees in I.T industries, the age varies between 22 and 30 years, 60-70% were male and earn typically around INR $600-$1000 per month. (27-29). Factors like income, younger age, staying away from family may influence sexual behaviors of the young workers.

The current study was designed to study the occupational groups of workers in the I.T and I.T.E.S. sectors in Bengaluru, India. We hypothesized that; workers in these two sectors exhibit specific sexual behavior patterns. Proper understanding of these behavioural patterns thus can be considered as an initial step for designing future intervention efforts. In this context, the current study offers a model for assessing the sexual behavior patterns and their determinants among IT/ITES professionals in Bengaluru, capital city of Karnataka. In specific, our study is aimed at understanding high-risk sexual behaviour and safe sex practices among IT/ITES professionals.

Methods

We conducted a cross sectional study of IT/ITES professionals in Bengaluru, the capital city of Karnataka. The source population comprised all I.T/I.T.E.S professionals aged 20-59 years working in "technical functions" in twenty-one selected worksites (units) of I.T/I.T.E.S sector and willing to join the study. By "technical functions", we mean all job categories involved in a human-computer interface within the four companies selected for the study. IT is a broad discipline, which uses computer technology in managing and processing information, especially in large organizations. In particular, IT deals with the use of electronic computers and computer software to convert, store, protect, process, transmit and retrieve information. ITES is a form of outsourced service, which has emerged due to the involvement of IT in various fields such as banking and finance, telecom, insurance and others. Some of the examples of ITES are medical transcription, business process activities such as accounting, insurance claims and credit card processing etc.

Eligibility criteria and Selection of subjects: We included workers in IT and ITES industry who were 20-59 years and were working as "technical workers". A technical worker is any person who belongs to a designated job classification as per the revised Indian National Classification of Occupations (NCO) - 2004 (30), and in specific, we defined "Technical worker" as a worker whose primary work/designation involves specific job codes (30, 31)

We excluded workers aged less than 20 years and older than 59 years, management and support staff workers, who were not directly involved in I.T/I.T.E.S sector (white collar workers) and workers whose job designation did not fall in the codes listed in the inclusion criteria (eg:- drivers, security guard) and workers who have worked for less than 1 year at the time of the interview.

Sample size: To calculate the sample size for a single proportion, we used the formula:

$$n = [Z_{1-\alpha/2}]^2 \, p(1-p)/d^2,$$

(Where α = significance level: 0.05 p = expected prevalence of Hypertension, d = desired precision which is half of the 95% CI) provided by Daniel et al, (32) and estimated the sample size using a sample size calculator. (33). We included 1071 subjects in our study of whom 509 were from the IT sector and 472 subjects were from the ITES sector. These subjects were volunteers who approached our research staff and agreed to participate. The details of the sample size calculation and method of recruitment is mentioned in the general methods section. (34)

The study was anonymous and did not collect identifying information from the volunteers. In addition, confidentiality was assured with respect to the collection of information and for restricted use of it only for the analysis of the study. After understanding all the required information, participants completed a self-administered questionnaire as part of the cross-sectional study in which sexual behaviour was assessed by a series of questions. The detailed questionnaire is attached in appendix.1. A detailed description of measures for the socio-demographic and general behavior of the participating professionals is described in the methods section. (34) In this study, we describe the measures related to sexual behavior.

Measures:

Information on high risk sexual behaviour was collected by seeking categorical answers yes or no for “Other than your wife or husband or partner, do you have another regular sexual partner whom you don’t pay to have sex?”, “Currently, do you have multiple partners for Sex?” and “In last 3 months, did you pay to have sexual intercourse with another person (male of female)?”. Also frequency of vaginal intercourse in last 3 months with other sexual partner (other than wife/husband/regular partner) whom the participants didn’t pay to have sex was enquired.

Number of vaginal intercourses with other sexual partners in last 3 months was reclassified as: 0=none, 1-6=occasional, 7-21=sometimes and >21=often. History of same sex intercourse was also enquired for seeking categorical answer, yes or no.

Safe sex practices were assessed by asking whether one used condom the last time he/she had vaginal intercourse with wife/partner/husband, who made the decision to use/not use the condom at that time and what was the reason for not using condoms every time he/she had vaginal intercourse with their wife/partner/husband.

Details of the measures related to contextual domains of occupational stress are described in detail in the methods section. (34) Job Stressors are defined as "working conditions that may lead to Acute Reactions, or strains in the worker." (34) We used "contextual stress domains" (34) developed as a result of qualitative study to assess job stress.(35)

Data Analysis

The collected data were entered in MS excel and cleaned. The data from the cross sectional survey was analyzed using SAS 9.1.3104(36). Descriptive analysis was done to determine the distribution of the socio-demographic and general behavioral characteristics of the participants, occupation stress and sexual behaviors. In the descriptive analyses of the categorical variables, frequencies, proportions and corresponding 95% confidence intervals were calculated using the survey frequency estimation method to incorporate the design effect associated with our cross-sectional collection of data.

Means and corresponding 95% confidence intervals of the continuous variables like age at marriage and age while having paid for sex for the first time in life were also derived. We used

logistic regression to calculate unadjusted estimates for the association of the sexual behaviors with socio-demographic and general characteristics and occupational stressors.

Next we repeated our logistic regression analyses for each of these associations while controlling for gender, marital status, ever use of tobacco, regular physical exercise and habit of drinking alcohol as from prior information based on literature review.(10, 11, 15, 17-19, 27, 28, 34, 37-52) These confounders were included in the model based on assumptions that are borne out of literature. While performing regressions using models for frequency of vaginal intercourse with irregular partner in last 3 months, cumulative logistic regressions were used for efficient analyses as these outcome variables had more than 2 categories.

Results

Information regarding 1071 voluntary participants was included in our analysis. The number of responses varied across interview questions and different questions were not applicable to different participants. Hence in both our descriptive and associational analyses numbers of included observations did vary for different variables of interest. The socio-demographic and general characteristics and occupational stress are described in the paper on methods.

Refusals: We invited 1369 IT/ITES professionals to participate in the study. The refusal rate was 4.7% (n=64). Further, 13% of professionals didn't return the questionnaires after they took them. Among the people who returned the questionnaire (1134), we found 51 to be ineligible, as they had worked less than one year. An additional 12 subjects with missing data on inclusion criteria were not included in the analysis. Hence the non-participation rate was 18%.

Completeness: Among 1071 eligible subjects, the percentage of completeness on sensitive questions varied. The completeness for some of the questions was good such as the questions related to marital status (99.8% answered it), Paid for sex (90%), Married More Than Once

(85.7%), multiple Sex Partner (85.3%), same sex intercourse (85.6%), frequency of intercourse in the last 3 months with irregular partner (82.5) and frequency of intercourse in the last month (77.6). However, the completeness of answering some questions was poor such as condom Usage (57.8%). In particular, the completeness for reasons why people do not use condoms was poor. Only 30-40% of the participants chose each of the reasons listed for not using condoms. [Decision to use condoms (30.7%), Condom Not necessary with wife (40.1%), don't like using condom (38.2%), Condom reduces pleasure (35.4%), want to have a child (36.4%), wife is pregnant (34.4%), don't have condom at the time of sex (35.4%), did not think about using condom (34.8%), use other contraceptives (35.3%) and other reasons (4.4%)]

Distribution of the sexual behaviour and related factors are presented in table 1a (categorical variables), condom use in Table.1b and continuous variables are presented in Table 1b. Out of 1069 subjects for whom we had the information on marital status, 42.6% of male and 42.2% of female professional were married. Among 918 subjects who answered the question regarding number of marriages, only 3.2% males and 4.2% of females were married more than once. Out of 434 subjects who answered the question regarding who usually initiates sex among the partners, around 74% of males and females reported that both husband and wife take the decision together. (Table-1a)

The mean age at marriage of among male professionals was 27.1 years and for females was 26.7 years. (Table-1c)

The results of descriptive, crude analysis and adjusted estimates are presented based on the type of outcome. The determinants of sexual risk behaviors assessed were of sexual intercourse with irregular partner, multiple partners, paid for sex and same sex intercourse. We assessed safe sex practices by examining the condom use among participants. We present the results

based on each of the outcome and examine their relation with each domain of occupational stress domains.

Sexual intercourse with irregular partners

Descriptive analysis: 884 subjects answered the question regarding the frequency of having vaginal intercourse in last 3 months with other (other than wife/husband /regular partner) sexual partners whom they didn't pay to have sex. 79.7% of males and 69.4% of females reported not having intercourse with such a partner in the last 3 months whereas 6% of males and 13% females reported *often* having intercourse with irregular partner in last 3 months. Only 4.2% of males indicated that they occasionally have sexual intercourse with non-paid irregular partners while this proportion was 14% among females. (Table-1a)

Crude analysis: Divorced professionals were 70% more likely to have frequent sexual intercourse with irregular partners in last 3 months. Participants earning more than $950 per month were 80% less likely to have higher frequency of intercourse in last 3 months with irregular partners compared to those earning less than $200. ITES workers were 80% more likely, occasional users of alcohol drinkers were 30% less likely and frequent users of alcohol drinkers were 40% less likely to have higher frequency of intercourse in last 3 months with irregular partners. Participants with high job control stressors were 60% more likely and high autonomy were 10% less likely to have higher frequency of sexual acts in last 3 months with irregular partners. (Table 2a)

Adjusted estimates: Participants with moderate level of stress related to length of experience were 70% less likely, and high level of shift related stress were 60% less likely to have higher frequency of sexual intercourse with their irregular partner in last 3 months. (Table 3a)

Multiple partners

Descriptive analysis: Among 914 subjects who answered the question, only 6.4% of males and 3.6% of females reported having multiple sexual partners. (Table-1a)

Crude analysis: Single workers were 50% less likely to have multiple partners than those who were married. Non-users of tobacco had 70% lower likelihood for ever use and 80% lesser likelihood of current use of having multiple partners. Workers with moderate levels of income related stress were 60% less likely to have multiple partners and appreciation related stress were twice that of their respective low levels of stress. (Table-2b)

Adjusted estimates:. The results for adjusted estimates were not statistically significant for any of the stressors (Table 3b)

Paid for sex

Descriptive analysis: 964 subjects answered the question regarding having paid for sex in last 3 months. Only 5% males and 2% females reported having paid for sex in the last 3 months. (Table-1a) 59 males and 4 female workers reported that they had ever paid to have sex with a mean age at first paid for sex of 24.9 and 27.7 years respectively. (Table-1a)

Crude analysis: Females and singles were 60% less likely, singles, participants who never used and who currently do not use tobacco were 70% less likely of having had paid for sex in the last 3 months. Participants from outside Bengaluru, occasional users of injectable drugs and non-injectable drug users were more likely of having paid for sex in the last 3 months. (Table-2c)

Adjusted estimates: Workers who had high level of physical stressors compared to those with lower levels had 6 times higher odds of having paid for sex in last 3 months. (Table-3c)

Same sex intercourse

Descriptive analysis: Of the 917 participants who chose to answer the question; only 7% male and 3% female professionals mentioned having same sex intercourse. (Table-1a)

Crude analysis: Among the participating IT/ITES workers, those with professional degree had 80% lesser likelihood with reference to those with pre-degree level of education; never users and current non-users of tobacco had 60% lower odds of having same sex intercourse. Frequent alcohol drinkers had thrice-higher likelihood, rare users of injectable drugs and non-injectable drugs had higher likelihood of having same sex intercourse. (Table-2d)

Adjusted estimates: The results for adjusted estimates were not statistically significant for any of the stressors (Table-3d)

Condom use

Descriptive analysis: Among 619 participants who responded to the condom usage question, 74% (both male and female workers) reported not using a condom during their last vaginal intercourse with their wife/husband/regular partner. 329 interviewees chose to answer the question regarding who makes the decision of using condom or not. 59% males and 50% female mentioned that both the participant and his/her partner together made the decision, while only 18% males and 16% females reported the decision being taken by the partner alone. Out of the 430 persons who responded the question on reason for not using condoms every time, 60% both male and female professionals said it is not necessary; out of 409, 45% males 42% female professionals said that they don't like using condom; out of 379, 52% of male and 46% female said that a condom reduces pleasure; out of 390, 50% of both genders mentioned that they want a child; among 369, 21% males stated that wife was pregnant. Among 379, 35% of male and female mentioned that they didn't have condom at the time of sex; among 373, 32% males and

35% females did not think of using a condom whereas out of 378, 25% males and 36% females informed that they adopt other contraceptives, so did not use condom. (Table-1b)

Crude analysis: Single subjects had 100%, ITES workers had 117% higher, and never users of tobacco had 80% higher odds of not using condom during the last intercourse with their wife/partner/husband. (Table-2e) Professional with high OSI, moderate and high time pressure, moderate job control stressors, high levels of work environment stressors and emotional job stresses were more likely to use condom during last coitus with wife/husband/partner. (Table-2e)

Adjusted estimates: Moderate level of income related stress compared to the corresponding low level was found to be associated with 2.4 times higher likelihood of not using condom during the last sexual intercourse with their wife/husband/regular partner. Subjects with high level of shift work had 60% lower odds. The numbers in the strata are too low to have precise estimates (Table-3e)

Discussion

Evidence regarding sexual behaviour studied across occupational groups and designing intervention programs based on the same is relatively scarce and is limited to only HIV prevention in a few geographical areas. (50, 53-58) It is reported that male sexual activity outside of marriage is an influential factor for the Indian HIV/STI epidemic. (40) Also, sexually Transmitted Infections including HIV mainly affect sexually active young people. (59) Young adults aged 15-29 years, account for 32% of AIDS cases reported in India and the number of young women living with HIV/AIDS is twice that of young men. (59) Most of the earlier studies done among IT/ITES professionals explored only physical health such as musculoskeletal symptoms, sleeping disorders, ear problems, and digestive and eye diseases.(27, 29, 60-62)

One study reported quality of life in ITES professionals.(63) To our knowledge, this is the first study to examine stress and sexual behaviour in IT and ITES professionals in India. Our study comprised young professionals, who were well paid and had a better quality of life compared to many other occupational groups. (27, 28, 64),(29) .

In our study population, we found some statistically significant associations between high stress levels and some sexual behaviors. Participants with moderate level of stress related to length of experience were 70% less likely, and high level of shift related stress were 60% less likely to have higher frequency of sexual intercourse with their irregular partner in last 3 months. Workers who had high level of physical stressors had higher likelihood of having paid for sex in the recent past. Income stress had higher likelihood of not using condom during the last sexual intercourse with their wife/husband/regular partner. Our study also reported inverse association duration of experience stressors and shift work with sexual intercourse with their irregular partner in the last 3 months. The study also reported that income stressors had higher and shift work had lower odds of using a condom during last sexual intercourse. There is scarce evidence available on stressors as determinants of sexual behaviour, specifically under occupational settings. (65, 66) In a study done by Bodenmann et al (2006), the results indicate that the relation between stress and sexual problems is incremental in nature even after adjusting for psychological symptoms and relationship quality.(67) Further, several studies suggest that stress levels are inversely proportional to satisfaction in relations. (68-71). This may result in poor or deviated sexual behaviors in the short term and deterioration of marriage leading to divorce in long term. (72-74) In Andhra Pradesh, India, results from a study showed that several stress factors were found to be important resulting in inconsistent condom use, acceptance of more money for sex without a condom, and experience of client violence.

The result from this study exploring association of occupational stress and sexual high-risk

behavior has some limits. First, the adjusted estimates about sexual risk behavior namely sexual intercourse with irregular partners, paid for sex, multiple partner and not using condoms were imprecise. The likely reason is that very few participants contributed information towards these risk behaviors. Even when information was largely complete (with completeness rate more than 80%), very few participants acknowledged or proceeded with further questions exploring high-risk behavior. There are studies done in India suggestive of conservative approach towards revealing information related to their sexuality.(38, 75-79) Hence, despite being assured of confidentiality and understanding the anonymous nature of the study, the participants might be reluctant to divulge any information which they may view as very sensitive and they aren't comfortable answering this. Second, we are not in a position to discuss further about systematic error including selection bias, confounding and measurement error when the estimates are not precise. The reason for this is whether these systematic errors or random error alone that is operating in these estimates.

In a study done near Bangalore, only a small proportion (3.5% of patients and 8% of controls) of subjects used condoms consistently. (80) Other studies done in Karnataka also suggest the same pattern. (81, 82) Inconsistent and poor condom use was reported from a study done among tea plantation workers of North Bengal in India. (83)

Our questionnaire didn't measure coping and hence the association with only some stress domains with lower odds of condom use might be because of unmeasured coping mechanisms. Further, there is considerable evidence that availability of condoms at workplaces for sale or free distribution has been significant factors for determination of condom use and in prevention of STI/HIV in developing countries.(84, 85) A study done by faculty at University of California Los Angeles (UCLA) showed that greater likelihood for consistent use of condoms was

determined by whether or not women had access to condoms.(86) It may be advisable to provide condoms at workplaces as a general rule.

Limitations

Our study had some limitations. There might be several reasons why the response rates for answering individual sensitive questions of the sexual behavior questionnaire were poor. The response rates for sexual behaviour questionnaire varied across different questions, with few questions answered by all the participants while only few people answered some sensitive questions. In Karnataka state, Bradley et al reported that young people rarely discuss about healthy sexuality and safe sex practices. (87) One of the predominant reasons for this is stigma about discussing sex and sexuality issues among young people.(38, 76-78) Another possible reason due to misconception that engaging in high-risk sexual activity is notional of masculinity amongst some subsets of youth (88-90). Our study did not have adequate power to detect and report some of the determinants contributing to high-risk behaviors.

Comprehensive stress assessment was beyond the scope of this study as its determinants extend beyond stress at the workplace but also includes stress from neighbourhood, outside world, financial stress and social stress. We included job stress, as a proxy to reflect most if not all components of external stress. Hence, all components of stress may not be well reflected and we might have underestimated stress. As it is cross sectional study, temporal ambiguity is also another limitation.

Conclusions and future directions

Our study explored the distribution and determinants of sexual behavior in a highly economically productive occupational setting. Findings of our study can be useful towards designing larger studies that may help in the planning of intervention programs specifically focused in this

workplace. The relation of stress and sexual behaviour is not unexpected and this study provides two positive associations towards this. Physical environment stressors were associated with paid sex in the recent past. Income stress had higher likelihood of not using condom during the last sexual intercourse with their wife/husband/regular partner. These findings calls in for closer examination of these factors in larger sample and further plan suitable interventions to address contextual stressors.

The study found some other positive associations, indicating greater sexual activity among divorced and single persons. It is necessary to target worksites to reach these persons. Such interventions would yield greater results if providing information and awareness targeted to single, divorced and widowed younger persons. It is important to concentrate on the subgroup with multiple partners, who might also share other risk behaviors who can be potential transmitters of STI's.

In conclusion, there is scope for improving awareness in promoting safe sex practices such as condom use and knowledge about alleviating high-risk behaviors in IT/ITES professionals.

Table.1.a: Distribution of sexual behavior measured as categorical variables in IT/ITES professionals

			Males			Females		
Variables	**Total (N)**	**Levels of variables**	**Freq.**	**%**	**[95% Conf. Interval]**	**Freq.**	**%**	**[95% Conf. Interval]**
Marital status	**1069**	Married	298	42.6	(38.9-46.3)	156	42.2	(37.1-47.2)
		Single	401	57.4	(53.7-61.0)	214	57.8	(52.8-62.9)
Sexual Debut	**581**	Early	29	7.0	(4.5-9.5)	4	2.4	(0.1-4.7)
		Normal	247	59.8	(55.0-64.5)	120	71.4	(64.5-78.3)
		Late	137	33.2	(28.6-37.7)	44	26.2	(19.5-32.9)
Married More Than Once	**918**	Yes	19	3.2	(1.8-4.7)	14	4.2	(2.0-6.4)
		No	566	96.8	(95.3-98.2)	319	95.8	(93.6-97.9)
Who initiates sex often	**434**	You	47	16.0	(11.8-20.3)	18	12.8	(7.2-18.3)
		Your wife/partner/husband	30	10.2	(6.7-13.7)	18	12.8	(7.2-18.3)
		Both you and your wife/husband/partner	216	73.7	(68.6-78.8)	105	74.5	(67.2-81.7)
Quality of sexual life (as rated by the participant)	**465**	Poor	78	25.1	(20.2-29.9)	28	18.2	(12.0-24.3)
		Good	145	46.6	(41.0-52.1)	91	59.1	(51.2-66.9)
		Excellent	88	28.3	(23.3-33.3)	35	22.7	(16.0-29.4)
Vaginal intercourse in the last one month	**887**	Yes	219	39.7	(35.5-43.8)	114	34.0	(28.9-39.1)
		No	333	60.3	(56.2-64.4)	221	66.0	(60.8-71.1)
Frequency of intercourse in the last month	**831**	None	333	66.3	(62.2-70.5)	221	67.2	(62.1-72.3)
		Occasionally	36	7.2	(4.9-9.4)	16	4.9	(2.5-7.2)
		Sometimes	49	9.8	(7.1-12.4)	39	11.8	(8.3-15.4)
		Often	84	16.7	(13.5-20.0)	53	16.1	(12.1-20.1)
Multiple Sex Partner	**914**	Yes	37	6.4	(4.4-8.4)	12	3.6	(1.57-5.54)
		No	540	93.6	(91.6-95.6)	325	96.4	(94.4-98.4)
Frequency of intercourse in the last 3 months with irregular partner	**884**	None	439	79.7	(76.3-83.0)	231	69.4	(64.4-74.3)
		Occasionally	58	10.5	(7.9-13.1)	14	4.2	(2.0-6.4)
		Sometimes	23	4.2	(2.5-5.9)	45	13.5	(9.8-17.2)
		Often	31	5.6	(3.7-7.6)	43	12.9	(9.3-16.5)
Paid for sex	**964**	Yes	31	4.9	(3.2-6.6)	6	1.8	(0.3-3.2)
		No	596	95.1	(93.3-96.7)	331	98.2	(96.8-99.6)
Same Sex Intercourse	**917**	Yes	41	6.9	(4.8-8.9)	9	2.8	(0.9-4.6)
		No	555	93.1	(91.1-95.1)	312	97.19	(95.4-99.0)

Legend: N: Total number in the study sample; Freq: number in the sub sample of gender; 95% Conf. Interval: 95% confidence interval

Table.1.b: Condom use in IT/ITES professionals

			Males			Females		
Variables	**(N)**	**Levels of variables**	**Freq.**	**%**	**[95% Conf. Interval]**	**Freq.**	**%**	**[95% Conf. Interval]**
Condom Usage	**619**	Yes	113	25.6	(21.5-29.6)	46	25.9	(9.4-32.5)
		No	329	74.4	(70.3-78.5)	131	74	(7.4-80.5)
Condom Decision	**329**	You	54	23.0	(17.6-28.4)	32	34	(24.3-43.8)
		Your wife / partner / husband	43	18.3	(13.3-23.4)	15	15.9	(8.4-23.5)
		Both you and your wife/husband/partner	138	58.7	(52.4-65.1)	47	50	(39.7-60.2)
Condom Not necessary with wife/husband	**430**	Yes	189	59.8	(54.4-65.2)	68	59.6	(50.5-68.8)
		No	127	40.2	(34.7-45.6)	46	40.3	(31.2-49.5)
Don't Like using condom	**409**	Yes	130	44.8	(39.1-50.5)	49	41.2	(32.2-50.1)
		No	160	55.2	(49.4-60.9)	70	58.8	(49.8-67.7)
Condom reduces pleasure	**379**	Yes	144	52.4	(46.4-58.3)	48	46.1	(36.4-55.8)
		No	131	47.6	(41.7-53.6)	56	53.8	(44.1-63.5)
Want to have a child	**390**	Yes	139	50.4	(44.4-56.3)	57	50	(40.6-59.3)
		No	137	49.6	(43.7-55.6)	57	50	(40.6-59.3)
Wife is pregnant	**369**	Yes	55	21.3	(16.3-26.3)	39	35.1	(26.1-44.1)
		No	203	78.7	(73.6-83.7)	72	64.8	(55.8-73.8)
Don't have condom at the time of sex	**379**	Yes	95	35.3	(29.6-41.1)	39	35.4	(26.3-44.5)
		No	174	64.7	(58.9-70.4)	71	64.5	(55.4-73.6)
Did not think about using condom	**373**	Yes	85	32.7	(26.9-38.4)	39	34.5	(25.6-43.4)
		No	175	67.3	(61.6-73.0)	74	65.4	(56.5-74.3)
Use other contraceptives	**378**	Yes	66	25.4	(20.0-30.7)	43	36.4	(27.6-45.2)
		No	194	74.6	(69.3-79.9)	75	63.5	(54.7-72.3)

Legend:
N: number in the sub sample of gender
95% CL: 95% confidence limits

Table.1.c. Distribution of the sexual behavioral that were measured as continuous variables among participating IT/ITES professionals

		Male			Female			
Variable	**N**	**Mean**	**Variance**	**95% CL**	**N**	**Mean**	**Variance**	**95% CL**
Sexual Debut	413	27.1	15.8	(26.7 - 27.5)	168	26.7	8.7	(26.2-27.2)
Age of Marriage	244	28	8.1	(27.7 - 28.4)	134	26.9	6.3	(26.6-27.4)
Age at first paid for sex	59	24.9	11.3	(24.0 - 25.8)	4	27.7	17.5	(21.1-34.4)

Legend:
N: number in the sub sample of gender
95% CL: 95% confidence limits

Table 2a. Association of the general characteristics and occupational stress with frequency of intercourse in the last 3 months with irregular partner

Variable	Levels	O R	CI	P Value
Gender	Male			Reference
	Female	0.5	(0.4 - 0.7)	0.89
Marital Status	Married			Reference
	Single	12	(7.9 - 18.3)	0.24
	Divorced	1.7	(0.4 - 7.3)	**0.04**
	Widow	3.8	(0.4 - 37)	Reference
Age of the children	Less than 4 Years Old			Reference
	4 to 12 Years Old	1	(0.6 - 1.8)	0.3
	13 to 18 Years Old	>999	(<0.001 - >999)	0.59
	Above 19 Years Old	5.9	(1.3 - 25.9)	0.31
Caste	Brahmin			Reference
	Other upper castes	1.2	(0.8 - 1.9)	0.7
	Backward caste	1.4	(0.8 - 2.4)	0.64
	Scheduled caste	1.3	(0.5 - 3.4)	0.5
	Scheduled tribe	0.6	(0.2 - 2.5)	0.39
	Decline to provide	1.2	(0.7 - 1.9)	0.66
Education	Pre-Degree *			Reference
	General Degree **	1.4	(0.6 - 3.4)	0.77
	Professional Degree ***	1.6	(0.7 - 3.8)	0.46
	Post Graduate ****	1.2	(0.5 - 2.8)	0.64
	PHD	>999	(<0.001 - >999)	0.98
Income per month (in rupees)	<10000			Reference
	>10000 and ≤ 30000	0.5	(0.1 - 2.1)	0.08
	>30000 and ≤ 50000	0.4	(0.1 - 1.7)	**0.01**
	>50000	0.2	(0 - 1)	**0.02**
Sector	IT			Reference
	ITES	1.8	(1.3 - 2.5)	**0.05**
Occupation	Entry			Reference
	Junior	1	(0.5 - 2)	0.4
	Middle Management	0.8	(0.4 - 1.4)	0.76
	Senior Management	0.7	(0.3 - 1.4)	0.64
Domicile Resident of Bengaluru	Yes			Reference
	No	2	(1.4 - 2.7)	0.48
	Others	3.5	(1.6 - 7.8)	0.8
Shift work	Yes			Reference
	No	1.5	(1.1 - 2.2)	0.62
Tobacco Ever Use	Yes			Reference
	No	1	(0.7 - 1.4)	0.4
Current Tobacco Use	Yes			Reference

	No	0.9	(0.6 - 1.3)	0.46
Alcohol	Never			Reference
	Rarely	0.6	(0.4 - 0.9)	0.1
	Occasionally	0.7	(0.5 - 1.1)	**0.02**
	Frequently	0.6	(0.3 - 1.1)	0
Injectable Drugs	Never			Reference
	Rarely	1.1	(0.5 - 2.3)	0.07
	Occasionally	1.1	(0.3 - 3.9)	0.09
	Frequently	>999	(<0.001 - >999)	Reference
Occupational Stress Index	Low			Reference
	Moderate	1	(0.7 - 1.4)	0.25
	High	1	(0.6 - 1.4)	0
Time Pressure	Low			Reference
	Moderate	0.8	(0.6 - 1.1)	0.55
	High	0.9	(0.5 - 1.5)	0.17
Length of experience	Low			Reference
	Moderate	0.6	(0.4 - 0.8)	0.6
	High	1	(0.4 - 2.5)	0.68
Shift work	Low			Reference
	Moderate	1.4	(0.4 - 5.1)	0.6
	High	1.2	(0.8 - 1.7)	0.52
Job Control	Low			Reference
	Moderate	1	(0.7 - 1.4)	0.3
	High	1.6	(1 - 2.6)	**0.02**
Income stressors	Low			Reference
	Moderate	1.3	(0.9 - 1.8)	0.65
	High	1.2	(0.7 - 1.9)	0.92
Autonomy	Low			Reference
	Moderate	1	(0.7 - 1.4)	0.09
	High	0.9	(0.5 - 1.5)	**0.01**
Appreciation of work	Low			Reference
	Moderate	0.7	(0.5 - 1.1)	0.55
	High	0.7	(0.5 - 1.1)	0.7
Physical environment	Low			Reference
	Moderate	1.3	(0.9 - 1.8)	0.1
	High	1.1	(0.7 - 1.7)	0.18
Work environment	Low			Reference
	Moderate	0.8	(0.5 - 1.1)	0.9
	High	1	(0.7 - 1.6)	0.44
Affect	Low			Reference
	Moderate	1.2	(0.8 - 1.6)	0.46
	High	1	(0.7 - 1.5)	0.67
	Moderate	0.9	(0.6 - 1.2)	0.82
	High	1.2	(0.8 - 1.8)	0.88

Table 2b. Association of the general characteristics and occupational stress with having multiple sexual partners

Variable	Levels	O R	CI	P Value
Gender	Male			Reference
	Female	0.5	(0.3 - 1.1)	0.07
Marital Status	Married			Reference
	Single	0.5	(0.3 - 0.9)	**0.02**
	Divorced	<0.001	(<0.001 - >999)	0.99
	Widow	<0.001	(<0.001 - >999)	0.99
Age of the children	Less than 4 Years Old			Reference
	4 to 12 Years Old	0.6	(0.2 - 1.8)	0.36
	13 to 18 Years Old	<0.001	(<0.001 - >999)	0.99
	Above 19 Years Old	<0.001	(<0.001 - >999)	0.97
Caste	Brahmin			Reference
	Other upper castes	0.8	(0.4 - 1.8)	0.55
	Backward caste	0.9	(0.4 - 2.2)	0.77
	Scheduled caste	<0.001	(<0.001 - >999)	0.98
	Scheduled tribe	<0.001	(<0.001 - >999)	0.99
	Decline to provide	0.8	(0.3 - 2)	0.58
Education	Pre-Degree *			Reference
	General Degree **	1	(0.2 - 4.8)	1
	Professional Degree ***	0.5	(0.1 - 2.5)	0.42
	Post Graduate ****	0.8	(0.2 - 3.5)	0.74
	PHD	<0.001	(<0.001 - >999)	0.99
Income per month (in rupees)	<10000			Reference
	>10000 and ≤ 30000	0.4	(0.1 - 1.9)	0.25
	>30000 and ≤ 50000	0.3	(0.1 - 1.6)	0.17
	>50000	0.5	(0.1 - 2.5)	0.4
Sector	IT			Reference
	ITES	1.2	(0.7 - 2.2)	0.51
Occupation	Entry			Reference
	Junior	1	(0.3 - 3)	0.94
	Middle Management	0.9	(0.3 - 2.6)	0.78
	Senior Management	0.7	(0.2 - 2.9)	0.65
Domicile Resident of Bengaluru	Yes			Reference
	No	1.1	(0.5 - 2.2)	0.81
	Others	1.9	(0.7 - 5.4)	0.21
Shift work	Yes			Reference
	No	0.9	(0.5 - 1.7)	0.71
Tobacco Ever Use	Yes			Reference
	No	0.3	(0.2 - 0.6)	**<.0001**
Current Tobacco Use	Yes			Reference

	No	0.2	(0.1 - 0.4)	**<.0001**
Alcohol	Never			Reference
	Rarely	1.6	(0.7 - 3.6)	0.31
	Occasionally	2	(0.9 - 4.1)	0.07
	Frequently	5.5	(2.2 - 13.4)	0
Injectable Drugs	Never			Reference
	Rarely	2.5	(0.8 - 7.3)	0.1
	Occasionally	1.8	(0.2 - 14.3)	0.58
	Frequently	<0.001	(<0.001 - >999)	0.99
Non Injectable Drugs	Never			Reference
	Rarely	5	(2.2 - 11.6)	0
	Occasionally	2.9	(0.6 - 12.9)	0.18
Occupational Stress Index	Low			Reference
	Moderate	0.5	(0.3 - 1)	0.06
	High	0.8	(0.4 - 1.7)	0.56
Time Pressure	Low			Reference
	Moderate	0.7	(0.4 - 1.4)	0.31
	High	0.3	(0.1 - 1.2)	0.08
Length of experience	Low			Reference
	Moderate	0.9	(0.4 - 1.9)	0.77
	High	<0.001	(<0.001 - >999)	0.98
Shift work	Low			Reference
	Moderate	<0.001	(<0.001 - >999)	0.99
	High	0.5	(0.2 - 1.2)	0.12
Job Control	Low			Reference
	Moderate	0.4	(0.2 - 0.8)	0
	High	0.5	(0.2 - 1.3)	0.14
Income stressors	Low			Reference
	Moderate	0.4	(0.2 - 0.9)	**0.02**
	High	1.9	(1 - 3.7)	0.07
Autonomy	Low			Reference
	Moderate	0.7	(0.4 - 1.3)	0.27
	High	<0.001	(<0.001 - >999)	0.97
Appreciation of work	Low			Reference
	Moderate	2.1	(1.1 - 4)	**0.03**
	High	1.7	(0.8 - 3.9)	0.18
Physical environment	Low			Reference
	Moderate	0.5	(0.2 - 1.1)	0.09
	High	1.5	(0.7 - 3.1)	0.28
Work environment	Low			Reference
	Moderate	0.7	(0.4 - 1.4)	0.28
	High	1.3	(0.6 - 2.6)	0.5
Affect	Low			Reference
	Moderate	1.2	(0.6 - 2.2)	0.66
	High	1.1	(0.5 - 2.4)	0.75

Table 2c. Association of the general characteristics and occupational stress with having paid for sex in last 3 months

Variable	Levels	O R	CI	P Value
Gender	Male			Reference
	Female	**0.4**	**(0.2 - 0.9)**	**0.02**
Marital Status	Married			Reference
	Single	**0.4**	**(0.2 - 0.9)**	**0.02**
	Divorced	<0.001	(<0.001 - >999)	0.99
	Widow	<0.001	(<0.001 - >999)	0.99
Age of the children	Less than 4 Years Old			Reference
	4 to 12 Years Old	0.9	(0.3 - 3)	0.89
	13 to 18 Years Old	<0.001	(<0.001 - >999)	0.99
	Above 19 Years Old	<0.001	(<0.001 - >999)	0.98
Caste	Brahmin			Reference
	Other upper castes	0.8	(0.3 - 2)	0.62
	Backward caste	0.5	(0.2 - 1.7)	0.27
	Scheduled caste	0.6	(0.1 - 5.3)	0.66
	Scheduled tribe	2.3	(0.3 - 21.4)	0.45
	Decline to provide	0.6	(0.2 - 1.9)	0.39
Education	Pre-Degree *			Reference
	General Degree **	1.3	(0.2 - 11.3)	0.79
	Professional Degree ***	0.7	(0.1 - 5.9)	0.74
	Post Graduate ****	1.4	(0.2 - 11)	0.75
	PHD	<0.001	(<0.001 - >999)	0.99
Income per month (in rupees)	<10000			Reference
	>10000 and ≤ 30000	0.4	(0.1 - 3.5)	0.42
	>30000 and ≤ 50000	0.8	(0.1 - 6.6)	0.84
	>50000	0.7	(0.1 - 5.8)	0.72
Sector	IT			Reference
	ITES	1.3	(0.7 - 2.6)	0.39
Occupation	Entry			Reference
	Junior	2.8	(0.4 - 22.4)	0.33
	Middle Management	2.9	(0.4 - 22.2)	0.31
	Senior Management	2.2	(0.2 - 21.4)	0.5
Domicile Resident of Bengaluru	Yes			Reference
	No	1.6	(0.6 - 3.8)	0.34
	Others	**3.5**	**(1.1 - 11.1)**	**0.04**
Shift work	Yes			Reference
	No	1.5	(0.8 - 3.1)	0.24
Tobacco Ever Use	Yes			Reference
	No	**0.3**	**(0.2 - 0.6)**	**0**
Current Tobacco Use	Yes			Reference
	No	**0.3**	**(0.2 - 0.6)**	**0**

Alcohol	Never			Reference
	Rarely	1.2	(0.5 - 2.7)	0.73
	Occasionally	0.9	(0.4 - 2)	0.72
	Frequently	1.8	(0.6 - 5.7)	0.3
Injectable Drugs	Never			Reference
	Rarely	2.4	(0.7 - 8.1)	0.17
	Occasionally	**5.6**	**(1.2 - 26.9)**	**0.03**
	Frequently	<0.001	(<0.001 - >999)	0.99
Non Injectable Drugs	Never			Reference
	Rarely	**3.1**	**(1.1 - 9.4)**	**0.04**
	Occasionally	4.1	(0.9 - 18.7)	0.07
Occupational Stress Index	Low			Reference
	Moderate	0.5	(0.2 - 1)	**0.05**
	High	0.7	(0.3 - 1.6)	0.37
Time Pressure	Low			Reference
	Moderate	1	(0.5 - 2.1)	0.96
	High	0.7	(0.2 - 2.3)	0.52
Length of experience	Low			Reference
	Moderate	0.5	(0.2 - 1.5)	0.2
	High	<0.001	(<0.001 - >999)	0.98
Shift work	Low			Reference
	Moderate	<0.001	(<0.001 - >999)	0.99
	High	0.8	(0.3 - 1.8)	0.54
Job Control	Low			Reference
	Moderate	0.7	(0.3 - 1.4)	0.26
	High	0.7	(0.3 - 2)	0.56
Income stressors	Low			Reference
	Moderate	**0.1**	**(0 - 0.5)**	**0**
	High	0.8	(0.3 - 2)	0.63
Autonomy	Low			Reference
	Moderate	0.6	(0.3 - 1.1)	0.1
	High	0.5	(0.1 - 2.1)	0.32
Appreciation of work	Low			Reference
	Moderate	1.8	(0.9 - 3.8)	0.11
	High	1.5	(0.6 - 3.8)	0.38
Physical environment	Low			Reference
	Moderate	0.3	(0.1 - 1)	0.06
	High	1.5	(0.7 - 3.5)	0.3
Work environment	Low			Reference
	Moderate	0.6	(0.3 - 1.4)	0.22
	High	1.3	(0.6 - 2.9)	0.57
Affect	Low			Reference
	Moderate	1.1	(0.5 - 2.3)	0.84
	High	1.1	(0.5 - 2.6)	0.85

Table 2d. Association of the general characteristics, occupational stress and quality of life with being engaged in same sex intercourse

Variable	Levels	O R	CI	P Value
Gender	Male			Reference
	Female	**0.4**	**(0.2 - 0.8)**	**0.01**
Marital Status	Married			Reference
	Single	**0.2**	**(0.1 - 0.4)**	**<.0001**
	Divorced	<0.001	(<0.001 - >999)	0.99
	Widow	<0.001	(<0.001 - >999)	0.99
Age of the children	Less than 4 Years Old			Reference
	4 to 12 Years Old	0.8	(0.3 - 1.9)	0.6
	13 to 18 Years Old	<0.001	(<0.001 - >999)	0.98
	Above 19 Years Old	<0.001	(<0.001 - >999)	0.97
Caste	Brahmin			Reference
	Other upper castes	2.1	(0.8 - 5.4)	0.14
	Backward caste	0.9	(0.3 - 3.2)	0.92
	Scheduled caste	2	(0.4 - 11)	0.41
	Scheduled tribe	2.9	(0.3 - 27.9)	0.35
	Decline to provide	1.1	(0.3 - 3.6)	0.9
Education	Pre-Degree *			Reference
	General Degree **	0.7	(0.2 - 2.8)	0.63
	Professional Degree ***	**0.2**	**(0 - 0.7)**	**0.01**
	Post Graduate ****	0.6	(0.2 - 2.3)	0.47
	PHD	<0.001	(<0.001 - >999)	0.99
Income per month (in rupees)	<10000			Reference
	>10000 and ≤ 30000	0.2	(0.1 - 1.2)	0.08
	>30000 and ≤ 50000	0.3	(0.1 - 1.7)	0.19
	>50000	0.6	(0.1 - 2.7)	0.46
Sector	IT			Reference
	ITES	0.9	(0.5 - 1.5)	0.58
Occupation	Entry			Reference
	Junior	0.6	(0.2 - 1.9)	0.35
	Middle Management	1.2	(0.4 - 3.5)	0.77
	Senior Management	1.3	(0.4 - 4.5)	0.73
Domicile Resident of Bengaluru	Yes			Reference
	No	1.1	(0.5 - 2.1)	0.87
	Others	1.1	(0.3 - 3.4)	0.92
Shift work	Yes			Reference
	No	1.5	(0.9 - 2.8)	0.15
Tobacco Ever Use	Yes			Reference
	No	**0.4**	**(0.2 - 0.6)**	**0**
Current Tobacco Use	Yes			Reference
	No	**0.4**	**(0.2 - 0.6)**	**0**

Alcohol	Never			Reference
	Rarely	2	(0.9 - 4.2)	0.09
	Occasionally	1.6	(0.8 - 3.4)	0.2
	Frequently	**3**	**(1.1 - 8)**	**0.03**
Injectable Drugs	Never			Reference
	Rarely	**4.5**	**(1.9 - 10.9)**	**0**
	Occasionally	<0.001	(<0.001 - >999)	0.99
	Frequently	<0.001	(<0.001 - >999)	1
Non Injectable Drugs	Never			Reference
	Rarely	**4.2**	**(1.8 - 9.6)**	**0**
	Occasionally	<0.001	(<0.001 - >999)	0.99
Occupational Stress Index	Low			Reference
	Moderate	1.1	(0.6 - 2)	0.81
	High	0.6	(0.2 - 1.4)	0.24
Time Pressure	Low			Reference
	Moderate	0.8	(0.4 - 1.6)	0.6
	High	1.9	(0.9 - 4)	0.11
Length of experience	Low			Reference
	Moderate	1.1	(0.5 - 2.3)	0.8
	High	0.6	(0.1 - 4.7)	0.65
Shift work	Low			Reference
	Moderate	2.8	(0.6 - 13.1)	0.18
	High	0.8	(0.4 - 1.7)	0.5
Job Control	Low			Reference
	Moderate	1	(0.5 - 1.8)	0.93
	High	0.4	(0.1 - 1.2)	0.09
Income stressors	Low			Reference
	Moderate	0.7	(0.4 - 1.3)	0.27
	High	0.5	(0.2 - 1.4)	0.2
Autonomy	Low			Reference
	Moderate	0.8	(0.5 - 1.5)	0.49
	High	0.2	(0 - 1.5)	0.11
Appreciation of work	Low			Reference
	Moderate	0.9	(0.5 - 1.8)	0.75
	High	1.5	(0.7 - 3)	0.28
Physical environment	Low			Reference
	Moderate	1.6	(0.8 - 3)	0.16
	High	0.8	(0.3 - 2.1)	0.64
Work environment	Low			Reference
	Moderate	1.4	(0.7 - 2.5)	0.34
	High	0.9	(0.4 - 2.1)	0.75
Affect	Low			Reference
	Moderate	1.9	(1 - 3.6)	0.06
	High	1.4	(0.6 - 3.2)	0.42

Table 2e. Individual association of the general characteristics, occupational stress and quality of life with not using condom during last sexual intercourse with wife/husband/regular partner

Variable	Levels	O R	CI	P Value
Gender	Male			Reference
	Female	1	(0.7 - 1.5)	0.91
Marital Status	Married			Reference
	Single	2	(1.4 - 3)	0
	Divorced	1.1	(0.3 - 5.8)	0.91
	Widow	>999	(<0.001 - >999)	0.99
Age of the children	Less than 4 Years Old			Reference
	4 to 12 Years Old	1.2	(0.7 - 2.4)	0.58
	13 to 18 Years Old	>999	(<0.001 - >999)	0.99
	Above 19 Years Old	1	(0.4 - 3.5)	0.97
Caste	Brahmin			Reference
	Other upper castes	1.5	(1 - 2.6)	0.1
	Backward caste	1.2	(0.7 - 2.2)	0.56
	Scheduled caste	>999	(<0.001 - >999)	0.98
	Scheduled tribe	0.9	(0.3 - 3.9)	0.89
	Decline to provide	1.1	(0.7 - 2)	0.76
Education	Pre-Degree *			Reference
	General Degree **	0.8	(0.3 - 2.6)	0.65
	Professional Degree ***	0.6	(0.2 - 1.8)	0.32
	Post Graduate ****	0.7	(0.3 - 2.1)	0.49
	PHD	>999	(<0.001 - >999)	0.99
Income per month (in rupees)	<10000			Reference
	>10001 and <30000	1	(0.3 - 3.8)	0.99
	=>30001 and <50000	0.5	(0.2 - 1.8)	0.28
	=>50001 per month	0.7	(0.2 - 2.7)	0.63
Sector	IT			Reference
	ITES	2.7	(1.9 - 4.1)	**<.0001**
Occupation	Entry			Reference
	Junior	0.5	(0.3 - 1.4)	0.2
	Middle Management	0.5	(0.2 - 1.2)	0.09
	Senior Management	0.4	(0.2 - 1.1)	0.06
Domicile Resident of Bengaluru	Yes			Reference
	No	1.2	(0.8 - 1.8)	0.44
	Others	1.4	(0.7 - 2.9)	0.38
Shift work	Yes			Reference
	No	1.1	(0.8 - 1.6)	0.68
Tobacco Ever Use	Yes			Reference
	No	1.8	(1.3 - 2.6)	**0**
Current Tobacco Use	Yes			Reference
	No	1.8	(1.3 - 2.7)	**0**
Alcohol	Never			Reference

	Rarely	0.7	(0.4 - 1.2)	0.12
	Occasionally	0.3	(0.3 - 0.6)	**<.0001**
	Frequently	0.3	(0.2 - 0.6)	**0**
Injectable Drugs	Never			Reference
	Rarely	0.8	(0.4 - 1.9)	0.59
	Occasionally	0.3	(0.1 - 1.1)	**0.05**
	Frequently	>999	(<0.001 - >999)	0.99
Non Injectable Drugs	Never			Reference
	Rarely	0.8	(0.4 - 1.9)	0.64
	Occasionally	0.2	(0.1 - 0.7)	**0.01**
Occupational Stress Index	Low			Reference
	Moderate	0.7	(0.5 - 1.1)	0.09
	High	0.6	(0.4 - 0.9)	**0.02**
Time Pressure	Low			Reference
	Moderate	0.7	(0.5 - 1)	**0.03**
	High	0.5	(0.4 - 1)	**0.03**
Length of experience	Low			Reference
	Moderate	0.7	(0.5 - 1.1)	0.1
	High	0.6	(0.2 - 2.6)	0.53
Shift work	Low			Reference
	Moderate	2.8	(0.4 - 22.7)	0.33
	High	1	(0.7 - 1.7)	0.9
Job Control	Low			Reference
	Moderate	0.7	(0.5 - 1)	**0.03**
	High	0.9	(0.6 - 1.6)	0.73
Income stressors	Low			Reference
	Moderate	1.2	(0.9 - 1.9)	0.35
	High	0.9	(0.6 - 1.6)	0.77
Autonomy	Low			Reference
	Moderate	1.4	(40910 - 0)	0.11
	High	1.1	(0.6 - 2.2)	0.85
Appreciation of work	Low			Reference
	Moderate	0.8	(0.6 - 1.3)	0.35
	High	0.9	(0.6 - 1.6)	0.75
Physical environment	Low			Reference
	Moderate	0.8	(0.6 - 1.3)	0.38
	High	0.7	(0.4 - 1.2)	0.13
Work environment	Low			Reference
	Moderate	0.9	(0.6 - 1.4)	0.52
	High	0.6	(0.4 - 1)	**0.05**
Affect	Low			Reference
	Moderate	1.1	(0.8 - 1.8)	0.54
	High	0.6	(0.4 - 0.9)	**0.01**

Table 3a. Adjusted estimates for the association of occupational stress and the frequency of sexual intercourse with irregular partner in last 3months

Variables	Levels	OR	95% CI	P Value
Occupational Stress Index		1	(1 - 1.1)	0.39
Time Pressure	Low	Reference		
	Moderate	0.7	(0.4 - 1.3)	0.20
	High	1.7	(0.6 - 5.1)	0.34
Length of experience	Low	Reference		
	Moderate	**0.3**	**(0.2 - 0.6)**	**0.00**
	High	1.4	(0.2 - 10.9)	0.73
Shift work	Low	Reference		
	Moderate	0.7	(0.2 - 4.1)	0.69
	High	**0.4**	**(0.2 - 0.8)**	**0.01**
Income stressors	Low	Reference		
	Moderate	0.6	(0.4 - 1.2)	0.16
	High	0.7	(0.3 - 1.6)	0.33
Autonomy	Low	Reference		
	Moderate	0.8	(0.5 - 1.5)	0.47
	High	0.9	(0.4 - 2.5)	0.79
Appreciation of work	Low	Reference		
	Moderate	1	(0.6 - 1.9)	0.99
	High	1	(0.5 - 2.2)	0.96
Physical related Stress Factor	Low	Reference		
	Moderate	1.1	(0.6 - 2.2)	0.80
	High	1	(0.5 - 2.4)	0.98
Work environment	Low	Reference		
	Moderate	1.2	(0.7 - 2.2)	0.59
	High	2.1	(1 - 5)	0.09
Job Control	Low	Reference		
	Moderate	0.6	(0.4 - 1.2)	0.11
	High	1.3	(0.6 - 3.3)	0.53
Emotion related stress factors	Low	Reference		
	Moderate	1.2	(0.7 - 2.4)	0.57
	High	0.9	(0.5 - 1.8)	0.73

Adjusted for gender, marital status, ever use of tobacco, regular physical exercise and habit of drinking alcohol

Table. 3b. Adjusted estimates for the association of occupational stress and having multiple sexual partners

Variables	Levels	OR	95% CI	P Value
Occupational Stress Index	-	1	(1 - 1.1)	0.76
Time Pressure	Low	Reference		
	Moderate	1.4	(0.5 - 4.1)	0.51
	High	0.5	(0.1 - 4.3)	0.52
Length of experience	Low	Reference		
	Moderate	0.6	(0.2 - 2.4)	0.47
	High	<0.001	(<0.001 - >999)	0.98
Shift work	Low	Reference		
	Moderate	<0.001	(<0.001 - >999)	0.98
	High	0.7	(0.3 - 2.4)	0.55
Income stressors	Low	Reference		
	Moderate	0.6	(0.2 - 2.5)	0.50
	High	2.7	(0.8 - 9.2)	0.11
Autonomy	Low	Reference		
	Moderate	0.5	(0.2 - 1.6)	0.25
	High	<0.001	(<0.001 - >999)	0.97
Appreciation of work	Low	Reference		
	Moderate	0.9	(0.3 - 2.6)	0.79
	High	0.5	(0.1 - 2.3)	0.33
Physical related Stress Factor	Low	Reference		
	Moderate	0.4	(0.1 - 2.1)	0.28
	High	2.1	(0.6 - 7.6)	0.25
Work environment	Low	Reference		
	Moderate	1.1	(0.4 - 3.4)	0.83
	High	0.7	(0.2 - 3.8)	0.69
Job Control	Low	Reference		
	Moderate	0.4	(0.2 - 1.2)	0.09
	High	0.2	(0.1 - 1.8)	0.15
Emotion related stress factors	Low	Reference		
	Moderate	1.2	(0.4 - 3.9)	0.78
	High	1.2	(0.4 - 4.4)	0.79

Adjusted for gender, marital status, ever use of tobacco, regular physical exercise and habit of drinking alcohol

Table 3c. Adjusted estimates for the association of occupational stress and having paid for sex in last 3 months

Variables	Levels	OR	95% CI	P Value
Occupational Stress Index	-	1	(1 - 1.1)	0.41
Time Pressure	Low	Reference		
	Moderate	1.6	(0.5 - 5.2)	0.48
	High	1.1	(0.2 - 6.6)	0.91
Length of experience	Low	Reference		
	Moderate	0.2	(0.1 - 2)	0.18
	High	<0.001	(<0.001 - >999)	0.98
Shift work	Low	Reference		
	Moderate	<0.001	(<0.001 - >999)	0.98
	High	1.4	(0.4 - 5.4)	0.61
Income stressors	Low	Reference		
	Moderate	0.2	(0.1 - 1.7)	0.13
	High	2.4	(0.6 - 9.8)	0.22
Autonomy	Low	Reference		
	Moderate	0.4	(0.1 - 1.3)	0.10
	High	<0.001	(<0.001 - >999)	0.96
Appreciation of work	Low	Reference		
	Moderate	1	(0.3 - 3.2)	0.94
	High	<0.001	(<0.001 - >999)	0.95
Physical related Stress Factor	Low	Reference		
	Moderate	0.7	(0.2 - 4)	0.68
	High	**6**	**(1.5 - 24.5)**	**0.01**
Work environment	Low	Reference		
	Moderate	0.8	(0.3 - 2.8)	0.69
	High	0.9	(0.2 - 4.8)	0.85
Job Control	Low	Reference		
	Moderate	1.5	(0.5 - 5.6)	0.53
	High	1	(0.2 - 6.2)	0.98
Emotion related stress factors	Low	Reference		
	Moderate	0.6	(0.2 - 2.3)	0.48
	High	0.5	(0.1 - 2.7)	0.39

Adjusted for gender, marital status, ever use of tobacco, regular physical exercise and habit of drinking alcohol

Table 3d. Adjusted estimates for the association of occupational stress and having intercourse with persons of same sex

Variables	Levels	OR	95% CI	P Value
Occupational Stress Index	-	1	(1 - 1.1)	0.56
Time Pressure	Low	Reference		
	Moderate	0.8	(0.3 - 2.4)	0.66
	High	3	(0.9 - 10.5)	0.08
Length of experience	Low	Reference		
	Moderate	1.5	(0.5 - 4.7)	0.49
	High	8.4	(0.8 - 98.3)	0.09
Shift work	Low	Reference		
	Moderate	6.7	(1 - 46.4)	0.06
	High	0.7	(0.2 - 2.6)	0.61
Income stressors	Low	Reference		
	Moderate	1.3	(0.5 - 3.8)	0.61
	High	0.6	(0.2 - 3.1)	0.54
Autonomy	Low	Reference		
	Moderate	1	(0.4 - 2.7)	0.97
	High	0.6	(0.1 - 5.3)	0.65
Appreciation of work	Low	Reference		
	Moderate	0.6	(0.3 - 2)	0.44
	High	1.3	(0.4 - 4.4)	0.72
Physical related Stress Factor	Low	Reference		
	Moderate	1.5	(0.5 - 4.7)	0.49
	High	1.1	(0.3 - 5.7)	0.91
Work environment	Low	Reference		
	Moderate	2	(0.8 - 5.7)	0.19
	High	0.7	(0.2 - 3.9)	0.67
Job Control	Low	Reference		
	Moderate	1.1	(0.5 - 3.2)	0.80
	High	0.3	(0.1 - 2.6)	0.26
Emotion related stress factors	Low	Reference		
	Moderate	2.3	(0.7 - 7.8)	0.17
	High	2.8	(0.8 - 10.4)	0.11

Adjusted for gender, marital status, ever use of tobacco, regular physical exercise and habit of drinking alcohol

Table 3e. Adjusted estimates for the association of occupational stress and not using condom during the last sexual intercourse with wife/husband/regular partner

Variable	Levels	OR	95% CI	P Value
Occupational Stress Index		1	(1 - 1)	0.09
Time Pressure	Low	Reference		
	Moderate	1	(0.6 - 2.1)	0.93
	High	1.4	(0.5 - 4.4)	0.60
Length of experience	Low	Reference		
	Moderate	0.6	(0.3 - 1.2)	0.15
	High	>999	(<0.001 - >999)	0.99
Shift work	Low	Reference		
	Moderate	0.5	(0.1 - 5.3)	0.58
	High	**0.4**	**(0.3 - 1)**	**0.04**
Income stressors	Low	Reference		
	Moderate	**2.4**	**(1.1 - 5.4)**	**0.04**
	High	0.9	(0.4 - 2.1)	0.76
Autonomy	Low	Reference		
	Moderate	1	(0.5 - 2)	0.97
	High	1.6	(0.4 - 6.4)	0.52
Appreciation of work	Low	Reference		
	Moderate	0.8	(0.4 - 1.7)	0.57
	High	1.3	(0.6 - 3.2)	0.60
Physical related Stress Factor	Low	Reference		
	Moderate	0.7	(0.4 - 1.5)	0.36
	High	0.5	(0.2 - 1.4)	0.18
Work environment	Low	Reference		
	Moderate	0.8	(0.4 - 1.6)	0.51
	High	0.6	(0.3 - 1.6)	0.31
Job Control	Low	Reference		
	Moderate	0.6	(0.3 - 1.2)	0.13
	High	1.1	(0.4 - 3.4)	0.85
Emotion related stress factors	Low	Reference		
	Moderate	1.3	(0.6 - 2.9)	0.53
	High	0.6	(0.3 - 1.4)	0.22

Adjusted for gender, marital status, ever use of tobacco, regular physical exercise and habit of drinking alcohol

Appendix.1: Questionnaire on Sexual behavior among IT/ITES professionals

The following questions refer to your sex life. Please note that they are sensitive questions. Including the answers here, none of answers mentioned in the entire questionnaire CANNOT be associated with any NAME or any other identifying information. *(Please circle the answer)*

Question	**Answers**
How old were you when you first had sexual intercourse?	Age in completed years: Don't remember
How old were you when you first got married?	Age (in completed years): Don't remember
Have you been married more than once?	Yes No
How old were you when you got married to your current wife/husband?	Age (in completed years): Don't remember
Generally, who decides if the two of you have sexual intercourse?	You Your wife/partner/husband Both you and your wife/husband
On a scale from 0 to 4, with 0 as "worst" and 4 as "excellent" how would you rate your sexual relationship with your wife/partner/husband?	Scale: 00 01 02 03 04
'Vaginal intercourse means inserting penis in vagina'	
Did you have vaginal intercourse with your wife/partner/Husband in the last 30 days?	Yes No
How many times did you have vaginal intercourse with your wife/partner/husband in the last **30 days**?	No. of times:
Other than your wife or husband or partner, do you have another regular sexual partner who you **don't pay to have sex**?	No Yes
Currently, do you have multiple partners for Sex?	Yes No
How many times did you have sexual intercourse with this regular partner in the **last 3 months?**	No. of sexual intercourse:
How old were when you first **paid** another person to have sexual	Age in completed years:

intercourse with you?	Don't remember
In last **3 months**, did you pay to have sexual intercourse with another person (male of female)?	No Yes
Where do you **most often** pick up paid for sex partner? Select <u>one</u> from the options (READ ALL RESPONSES)	Bar/ Public place (street / park / railway station) /Agent/ Brothel/ Hotel/Lodge / Near Home/ Dhaba
The last time you had vaginal intercourse with your wife/partner, was a condom used?	No Yes
Who made the decision to use/not use the condom at that time?	You Your wife/Partner Both you and your wife/partner together

What is the reason for not using condoms **every time** you have vaginal intercourse with your wife/partner?

Please say "yes" or "no" for each of the following reasons

Condom not necessary with wife/ regular partner	Yes	No
You don't like using condom	Yes	No
Condom reduces pleasure	Yes	No
You want to have a child	Yes	No
Wife is	Yes	No
pregnant	Yes	No
You did not have a condom at the time of sex	Yes	No
The thought of using condom did not occur	Yes	No
Use other contraceptives/ wife operated	Yes	No
Other reasons	Yes	No

Thank you for your time

References:

1. Kumar R, Mehendale S, Panda S, Venkatesh S, Lakshmi P, Kaur M, et al. Impact of targeted interventions on heterosexual transmission of HIV in India. BMC Public Health. 2011;11(1):549.
2. Organization NAC, Control DoA, Health Mo, Welfare F, India Go. 2009.
3. VISION U. UNAIDS report on the global AIDS epidemic 2010.
4. Ghosh P, Arah OA, Talukdar A, Sur D, Babu GR, Sengupta P, et al. Factors associated with HIV infection among Indian women. International journal of STD & AIDS. 2011;22(3):140-5.
5. Gangakhedkar RR, Bentley ME, Divekar AD, Gadkari D, Mehendale SM, Shepherd ME, et al. Spread of HIV Infection in Married Monogamous Women in India. JAMA: The Journal of the American Medical Association. 1997 December 17, 1997;278(23):2090-2.
6. Hernandez AL, Lindan CP, Mathur M, Ekstrand M, Madhivanan P, Stein ES, et al. Sexual behavior among men who have sex with women, men, and Hijras in Mumbai, India--multiple sexual risks. AIDS Behav. 2006 Jul;10(4 Suppl):S5-16.
7. Liu GG, Guo JJ, Smith SR. Economic costs to business of the HIV/AIDS epidemic. pharmacoeconomics. 2004;22(18):1181-94.
8. Rosen S, Simon J, Vincent JR, MacLeod W, Fox M, Thea DM. AIDS is your business. Harvard Business Review. 2003;81(2):80-7.
9. Marseille E, Dandona L, Marshall N, Gaist P, Bautista-Arredondo S, Rollins B, et al. HIV prevention costs and program scale: data from the PANCEA project in five low and middle-income countries. BMC Health Services Research. 2007;7(1):108.
10. Halli SS, Buzdugan R, Ramesh BM, Gurnani V, Sharma V, Moses S, et al. Assessing HIV Risk in Workplaces for Prioritizing HIV Preventive Interventions in Karnataka State, India. Sexually transmitted diseases. 2009;36(9):556.
11. Pandey A, Benara SK, Roy N, Sahu D, Thomas M, Joshi DK, et al. Risk behaviour, sexually transmitted infections and HIV among long-distance truck drivers: a cross-sectional survey along national highways in India. Aids. 2008;22:S81.
12. Chaitanya C, Seema A. Sexual behaviour among truck drivers halting at Kalamboli Truck Terminal, Navi Mumbai. Australasian Medical Journal. 2010;1(4):271-4.
13. Upadhyay A, Pawar AB, Bansal RK. Sexual profile of truckers in Surat district. National Journal of Community Medicine. 2010;1(1):21-3.
14. Reza-Paul S MV, Mukherjee S, et al, editor. A sexual behavior survey among male and female textile factory workers in Tirupur, India. Int Conf AIDS 2002.
15. Audinarayana N. Sexual behaviour and its determinants among young never-married male factory workers in a South Indian Knit City. Journal of Population and Social Studies. 2009;18(2):155-74.
16. Mustikawati DE, Morineau G, Nurhayati, Irmaningrum Y, Riono P, Priohutomo S, et al. Sexual risk taking, sexually transmitted infections and HIV prevalence among four "high-risk" occupational groups of Indonesian men. Sexually Transmitted Infections. 2009;85(5):391-6.
17. Campbell C, Williams B. Beyond the biomedical and behavioural: towards an integrated approach to HIV prevention in the Southern African mining industry. Social Science & Medicine. 1999;48(11):1625-39.
18. Campbell C. Migrancy, masculine identities and AIDS: The psychosocial context of HIV transmission on the South African gold mines. Social Science & Medicine. 1997;45(2):273-81.
19. Heywood M. Mining industry enters a new era of AIDS prevention. Eye witness: South Africa. AIDS Anal Afr. 1996 19960805;6(3).
20. Kumwenda NI, Taha TE, Hoover DR, Markakis D, Liomba GN, Chiphangwi JD, et al. Three surveys of HIV-1 prevalence and risk factors among men working at a sugar estate in Malawi. Sexually transmitted diseases. 2002;29(6):366.
21. Morris CN, Wilkinson D, Stein Z, Cheevers E. A multi-sectorial committee in directing HIV/AIDS-specific interventions in the occupational setting: An example from South Africa. AIDS patient care and STDs. 2001;15(3):153-8.

22. Bailey A. Left at sea: HIV vulnerability among migrant fishermen in Goa, India. Int Marit Health. 2011 20110912;62(2):122.
23. Pickering H, Okongo M, Ojwiya A, Yirrell D, Whitworth J. Sexual networks in Uganda: mixing patterns between a trading town, its rural hinterland and a nearby fishing village. International journal of STD & AIDS. 1997 August 1, 1997;8(8):495-500.
24. Yahya-Malima K, Matee M, Evjen-Olsen B, Fylkesnes K. High potential of escalating HIV transmission in a low prevalence setting in rural Tanzania. BMC Public Health. 2007;7(1):103.
25. Balyagati D, Luhamba D, Nnko S, Nyonyo V, Schapink D. HIV / AIDS and STD health promotion in Tanzanian fishing villages. AIDS STD Health Promot Exch. 1995(2):3-7.
26. National Association of Software and Service Companies N. The IT-BPO Sector in India : Strategic Review 20122012.
27. Kesavachandran C, Rastogi S, Das M, Khan AM. Working conditions and health among employees at information technology-enabled services: A review of current evidence. Indian Journal of Medical Sciences. 2006;60(7):300.
28. Shah P, Reddy P, Hegde S. Stress: Occupational health disorder amongst computer professionals. Indian J Occup Health. 1999;3:71-3.
29. Suparna K, Sharma A, Khandekar J. Occupational health problems and role of ergonomics in information technology professionals in national capital region. Indian Journal of Occupational and Environmental Medicine. 2005;9(3):111.
30. India Go. National classification of occupations: occupational titles with definitions: Directorate General of Employment & Training (DGET), Ministry of Labour & Employment; 2004.
31. Babu GR. Chapter.2. Methods of IT/ITES study in Bengaluru, India. Epidemiology. [Papers]. 2012 June 2012;PhD:41.
32. Daniel WW. Biostatistics: Basic concepts and methodology for the health sciences: John Wiley & Sons; 2010.
33. Dean A, Sullivan K, Soe M. OpenEpi: open source epidemiologic statistics for public health, version 2.3. Update. 2009;20(05).
34. Giridhara R Babu RD. Chapter.2. Methods of IT/ITES study in Bengaluru, India [Papers]. Los Angeles: University of California Los Angeles; 2012.
35. Giridhara R Babu RD. Chapter.3. A Qualitative study about work-environment of software professional in Bengaluru, India [Papers]. Los Angeles: University of California Los Angeles; 2012.
36. Institute S. SAS software: version 9.1. SAS Institute Cary, NC; 2002.
37. Abraham L, Kumar KA. Sexual Experiences and Their Correlates Among College Students in Mumbai City, India. International Family Planning Perspectives. 1999;25(3):139-52.
38. Alexander M, Garda L, Kanade S, Jejeebhoy S, Ganatra B. Correlates of Premarital Relationships among Unmarried Youth in Pune District, Maharashtra, India. International Family Planning Perspectives. 2007;33(4):150-9.
39. Angus N, Stephenson J, Griffioen A, Cliffe S, Rogers P, Boisson E. The relationship of HIV prevalence in pregnant women to that of reproductive age: a validated method for adjustment. Aids. 1998;12:1861 - 67.
40. Arora P, Nagelkerke N, Sema KS, Rajesh K, Neeraj D, Prabhat J. HIV, HSV-2 and syphilis among married couples in India: patterns of discordance and concordance. Sexually Transmitted Infections. 2011;87(6):516-20.
41. Basu I, Jena S, Rotheram-borus M, Swendenman D, Lee S, Newman P, et al. HIV prevention among sex workers in India. J Acquir Immune Defic Synd. 2004;36:845 - 52.
42. Bedimo AL, Bennett M, Kissinger P, Clark RA. Understanding barriers to condom usage among HIV-infected African American women. Journal of the Association of Nurses in AIDS Care. 1998;9(3):48-58.
43. Bowen KJ, Dzuvichu B, Rungsung R, Devine AE, Hocking J, Kermode M. Life Circumstances of Women Entering Sex Work in Nagaland, India. Asia-Pacific Journal of Public Health. 2011;23(6):843-51.

44. Collumbien M, Das B, Bohidar N. Male sexual debut in Orissa, India: context, partners and differentials. Asia Pacific Population Journal. 2001;16(2):211-24.
45. Cranson DA, Caron SL. An investigation of the effects of HIV on the sex lives of infected individuals. AIDS education and prevention. 1998;10(6):506-22.
46. Dandona R, Dandona L, Guiterrez J, Kumar A, McPherson S, Samuels F, et al. High risk of HIV in non-brothel based female sex workers in India. BMC Public Health. 2005;5:87.
47. Dandona R, Dandona L, Kumar GA, Gutierrez J, McPherson S, Samuels F, et al. Demography and sex work characteristics of female sex workers in India. BMC International Health and Human Rights. [10.1186/1472-698X-6-5]. 2006;6(1):5.
48. Dasgupta A, Saha B, Taraphdar P. Coital debut of people living With HIV/AIDS attending school of tropical medicine, Kolkata. Indian Journal of Public Health. 2009;53(4):240-2.
49. Devine A, Bowen K, Dzuvichu B, Rungsung R, Kermode M. Pathways to sex-work in Nagaland, India: implications for HIV prevention and community mobilisation. AIDS Care. 2010 2010/02/01;22(2):228-37.
50. Dolan K, Larney S. HIV in Indian prisons: Risk behaviour, prevalence, prevention & treatment. The Indian journal of medical research. 2010;132(6):696.
51. Egger M, Pauw J, Lopatatzidis A, Medrano D, Paccaud F, Smith GD. Promotion of condom use in a high-risk setting in Nicaragua: a randomised controlled trial. The Lancet. 2000;355(9221):2101-5.
52. Kenen RH, Armstrong K. The why, when and whether of condom use among female and male drug users. Journal of Community Health. 1992;17(5):303-17.
53. HOPE KR. Promoting behavior change in Botswana: An assessment of the peer education HIV/AIDS prevention program at the workplace. Journal of health communication. 2003;8(3):267-81.
54. Reed JC. Hiv/aids workplace interventions in south africa and the united states. 2005.
55. Dickinson D. Smokescreen or opening a can of worms? Workplace HIV/AIDS peer education and social protection in South Africa. African studies. 2006;65(2):321-42.
56. Charalambous S, Innes C, Muirhead D, Kumaranayake L, Fielding K, Pemba L, et al. Evaluation of a workplace HIV treatment programme in South Africa. Aids. 2007;21:S73.
57. George G, Sprague C. HIV prevention in the world of work in sub-Saharan Africa: research and practice. African Journal of AIDS Research. 2011;10(sup1):291-300.
58. Anderson R. A contextual assessment of a workplace HIV/AIDS peer education programme 2010.
59. McManus A, Lipi D. Study of knowledge, perception and attitude of adolescent girls towards STIs/HIV, safer sex and sex education: (a cross sectional survey of urban adolescent school girls in South Delhi, India). BMC Women's Health. 2008;8(12):(23 July 2008).
60. Halli SS, Buzdugan R, Ramesh BM, Gurnani V, Sharma V, Moses S, et al. Assessing HIV Risk in Workplaces for Prioritizing HIV Preventive Interventions in Karnataka State, India. Sexually transmitted diseases. 2009;36(9).
61. Ganguly K. Managing Customer Hostility in Transnational Call Centers in India. 2009.
62. Dube D, Dube I, Gawali BR, Haldar S. Women in BPO Sector in India: A Study of Individual Aspirations and Environmental Challenges. Asian Social Science. 2012;8(7):p157.
63. Jha A, Sadhukhan SK, Velusamy S, Banerjee G, Banerjee A, Saha A, et al. Exploring the quality of life (QOL) in the Indian software industry: a public health viewpoint. International Journal of Public Health. 2011:1-11.
64. Giridhara R Babu RD. Chapter.1. Introduction, Job stress and hypertension: A systematic review and meta-analysis of observational studies [Papers]. Los Angeles: University of California Los Angeles; 2012.
65. Erausquin JT, Reed E, Blankenship KM. Police-related experiences and HIV risk among female sex workers in Andhra Pradesh, India. Journal of Infectious Diseases. 2011;204(Suppl. 5):S1223-S8.

66. Black P. Special Issue: The economic impact of HIV and AIDS on the public health care system, households and labour sector. South African Journal of Economics. 2008;76(suppl. 1):S1-S85.
67. Bodenmann G, Ledermann T, Blattner D, Galluzzo C. Associations Among Everyday Stress, Critical Life Events, and Sexual Problems. The Journal of Nervous and Mental Disease. 2006;194(7):494-501 10.1097/01.nmd.0000228504.15569.b6.
68. Harper JM, Schaalje BG, Sandberg JG. Daily hassles, intimacy, and marital quality in later life marriages. Am J Fam Ther. [Article]. 2000 Jan-Mar;28(1):1-18.
69. Cohan CL, Bradbury TN. Negative life events, marital interaction, and the longitudinal course of newlywed marriage. J Pers Soc Psychol. 1997 Jul;73(1):114-28.
70. Bodenmann G. Dyadic Coping and Its Significance for Marital Functioning. Couples coping with stress: Emerging perspectives on dyadic coping: Washington, DC, US: American Psychological Association; 2005. p. 33-49.
71. Story LB, Bradbury TN. Understanding marriage and stress: essential questions and challenges. Clin Psychol Rev. 2004 Jan;23(8):1139-62.
72. Bodenmann G, Cina A. Stress and Coping Among Stable-Satisfied, Stable-Distressed, and Separated/Divorced Swiss Couples: A 5-Year Prospective Longitudinal Study. Journal of Divorce & Remarriage. 2005.
73. Cutrona CE, Russell DW, Abraham WT, Gardner KA, Melby JN, Bryant C, et al. Neighborhood context and financial strain as predictors of marital interaction and marital quality in African American couples. Personal Relationships. [10.1111/1475-6811.00056]. 2003;10(3):389-409.
74. Bodenmann G, Pihet S, Kayser K. The relationship between dyadic coping and marital quality: A 2-year longitudinal study. Journal of Family Psychology. 2006;20(3):485.
75. Aggarwal O, Sharma AK, Chhabra P. Study in sexuality of medical college students in India. Journal of Adolescent Health. 2000;26(3):226-9.
76. Fatusi AO, Hindin MJ. Adolescents and youth in developing countries: Health and development issues in context. Journal of Adolescence. 2010;33(4):499-508.
77. Miller KS, Whitaker DJ. Predictors of mother-adolescent discussions about condoms: Implications for providers who serve youth. Pediatrics. 2001;108(2):e28-e.
78. Santhya KG, Acharya R, Jejeebhoy SJ, Ram U. Timing of first sex before marriage and its correlates: evidence from India. Culture, Health & Sexuality. 2010 2011/03/01;13(3):327-41.
79. Rao TSS. Some thoughts on sexualities and research in India. Indian Journal of Psychiatry. 2004;46(1):3.
80. George S, Jacob M, John TJ, Jain MK, Nathan N, Richard J, et al. A case-control analysis of risk factors in HIV transmission in South India. JAIDS Journal of Acquired Immune Deficiency Syndromes. 1997;14(3):290.
81. Wray JD, Falkner F. Breast-feeding: An international and historical review. Infant and child nutrition worldwide: Issues and perspectives. 1991.
82. Kiran D, Albayrak M, RAD AHS, Song-Ying S, Laxmi G, Jian L, et al. A study on risk factors associated with inconsistent condom and lubricant use among men who have sex with men in central Karnataka, India. 2011.
83. Pal R, Roy S, Pal S. Opportunities and Barriers of Sexual Health and Condom Use among Tea Plantation Workers. IGI Global; 2011. p. 30-8.
84. COHEN DA. Condom availability for HIV/STD prevention. AIDS patient care and STDs. 1999;13(12):731-7.
85. Levine DA. Need for services in a new urban teenage clinic for men. Journal of the National Medical Association. 2000;92(1):42.
86. Morisky DE, Pe√±a M, Tiglao TV, Liu KY. The impact of the work environment on condom use among female bar workers in the Philippines. Health education & behavior. 2002;29(4):461-72.

87. Bradley J, Rajaram S, Moses S, Parinita B, Lobo AM, Ramesh BM, et al. Changes in HIV knowledge, and socio-cultural and sexual attitudes in South India from 2003-2009. BMC Public Health. 2011;11(Suppl. 6):S12.
88. Abraham L. Bhai-behen, true love, time pass: Friendships and sexual partnerships among youth in an Indian metropolis. Culture, Health & Sexuality. 2002;4(3):337-53.
89. Forste R, Haas DW. The transition of adolescent males to first sexual intercourse: anticipated or delayed? Perspectives on Sexual and Reproductive Health. 2002:184-90.
90. Courtenay WH. Constructions of masculinity and their influence on men's well-being: a theory of gender and health. Social science & medicine. 2000;50(10):1385-401.

Chapter 6: Quality of Life and Musculoskeletal symptoms among IT/ITES professionals

Introduction

There have been several attempts in public health to measure health and disease focusing on impairment of routine activities [1], perceived health measures, [2] disability measures [3], the burden of disease such as disability adjusted life years [4], quality adjusted life years[5] and health-adjusted years of life [6]. Nonetheless, none of these methods assess quality of life and assess only how illnesses affect life. The researchers in social sciences did not address quality of life, which Fallowfield declared as "The missing measurement in health care."[6] Hence, the development of a "Quality of Life [7]" measurement by the World Health Organization (W.H.O) was an effort in shifting from mechanistic models of biomedical research to concentrating on overall well-being status of individuals.[8]

Quality of life is defined as the "individuals' perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns."[7, 9] Hence, quality of life denotes subjective contexts of physical, psychological, cultural, social and environmental perceptions in holistic perspective. WHOQOL-100, a detailed assessment of quality of life was developed through evaluation in 15 culturally diverse field centers.[7, 9] Subsequently, the WHOQOL-BREF was developed as a shorter version to assess quality of life by examining only four domains but nonetheless provides a reliable comprehensive assessment of each facet relating to quality of life.[7, 9-11]

WHOQOL-BREF is a widely used instrument to assess several diseases such as HIV,[12] psychiatric conditions [8, 13, 14], liver transplantation,[15] chronic fatigue syndrome[16], physiological status such as in older adults[17] and stressful events[18]. Information from QoL indicators can be useful to compare different occupational groups and the same occupational

group in different regions and countries. [19] A limited number of studies done in India have ascertained the quality of life in professionals working in Information Technology (IT) and Information Technology Enabled Services (ITES) professionals.[20, 21]

Human beings endeavor to attain better quality of life by using their skills, available resources and by constantly working harder. Hence, workers subject themselves to greater degrees of pressure to achieve a better quality of life. However, there have been no attempts in India to explore psychosocial determinants such as how much job stress might have to be endured to reach a higher quality of life. This study aims to examine several domains of job stress among IT/ITES professionals and estimate how much stress IT/ITES professionals have to endure to reach positive levels of quality of life.

This study also looked at musculoskeletal symptoms among IT/ITES professionals. Work-related Musculoskeletal Symptoms (WMS) are defined as symptoms related to lesions of the muscles, tendons, ligaments, peripheral nerves, joints, cartilage, bones and/or supporting blood vessels in the upper or lower extremities or back, which is caused or aggravated by exposure to risk factors in the workplace and is not the result of acute or instantaneous events.[22] WMS are common in computer users involving muscle, fascia, tendon and/or neurovascular structures in any part of the body.[23] [24] Work related Musculoskeletal Symptoms (WMS) are a group of symptoms common in computer users involving muscle, fascia, tendon and/or neurovascular structures in any part of the body.[23]

Methods

The study population comprised 1071 IT/ITES professionals including 509 in the IT sector and 472 in the ITES sector, [25] A detailed description of methods including sample size, method of recruitment is provided in chapter.2.[25] In brief, the study area was Bengaluru, known as the

"silicon valley" of India. We included workers in IT and ITES industry who were 20-59 years and were working as "technical workers". A technical worker is any person who belongs to a designated job classification as per the revised Indian National Classification of Occupations [26] - 2004 [27], and in specific, we defined "Technical worker" as a worker whose primary work/designation involves specific job codes [27, 28] We excluded workers aged less than 20 years and older than 59 years, management and support staff workers, who were not directly involved in I.T/I.T.E.S sector (white collar workers) and workers whose job designation did not fall in the codes listed in the inclusion criteria (For example:- drivers, security guard) and workers who have worked for less than 1 year at the time of the interview.

The study was anonymous and we did not collect identifying information from the volunteers. In addition, confidentiality was assured with respect to the collection of information and restricted use of it only for the analysis of the study. After understanding all the required information, participants completed a questionnaire that contained self-reported quality of life questions and stressors. The detailed questionnaire is attached in appendix.1. A detailed description of measures for the socio-demographic and general behavior of the participating professionals is described in the methods section. [29] In this study, we describe the measures related to Quality of Life (QoL) and musculoskeletal symptoms.

Measures

Quality of Life

The original questionnaire developed by WHO, WHOQOL-100 is a thorough evaluation of individual facets relating to quality of life.[10, 11, 19] The WHOQOL- BREF is shorter version of quality of life assessment that looks at Domain level profiles, The WHOQOL-BREF contains 26 question with one item from each from the 24 facets in the WHOQOL-100, one item to assess overall quality of Life and one item to examine general health facet. The WHOQOL-BREF

estimates quality of life through four domain scores. The four domain scores denote an individual's perception of quality of life in each particular domain, with higher scores denoting higher quality of life. The mean score of items within each domain is used to calculate the complete domain score. The scores are multiplied by 4 to obtain domain scores similar to WHOQOL-100.

Table-1 describes the domains, facets incorporated within each domain. For detailed questions, refer to annexure.1: QOL questionnaire. The WHOQOL six domain scores denote an individual's perception of quality of life in the following domains: Physical, Psychological, Level of Independence, Social Relationships, Environment, and Spirituality. Individual items are rated on a Likert scale where 1 indicates low, negative perceptions and 5 indicates high, positive perceptions. As an example, an item in the positive feeling facet asks "How much do you enjoy life?" and the available responses are 1 (not at all), 2 (a little) 3 (a moderate amount), 4 (very much) and 5 (an extreme amount). As such, domain and facet scores are scaled in a positive direction where higher scores denote higher quality of life. Some facets (Pain and Discomfort, Negative Feelings, Dependence on Medication, Death and Dying) are not scaled in a positive direction, but in a reverse direction. We calculated quality of life using SPSS syntax file, which we obtained from the WHOQOL SRPB Coordinator, Mental Health: Evidence and Research, Department of Mental Health and Substance Dependence, CH-1211 Geneva 27, Switzerland. The WHO-QoL,[30] a generic measure of health-related quality of life which will be used to assess health status of workers according to job titles held by them.

The domain of physical quality of life assesses physical health through questions (3 , 4 , 10 , 15, 16 , 17, 18, 19 and 26) relating to dependence on medicinal substances and medical aids, energy and fatigue, ease of mobility, bodily pain and discomfort, sleep and rest and work capacity. The psychological domain assesses psychological quality of life through question (5, 6

, 7 , 11, 1) addressing negative feelings , positive feelings, self-esteem, beliefs about spirituality / religion and thinking, learning, memory and concentration. The social quality of life is assessed by social domain through questions (20-22) on personal relationships, social support and sexual activity. The environmental quality of life is assessed by scoring (questions 8-9, 12-14, and 23-25) financial resources, freedom, physical safety and security, accessibility and quality of health and social care, environment at home, opportunities for acquiring new information and skills, participation in and opportunities for recreation or leisure activities, physical environment (pollution / noise / traffic/ climate) and transport. A detailed description of questions is provided in appendix.2.

Job stress

Job stress was calculated by combining different combinations of some or all of the job stressors used in the study. “Job Stressors” are defined as “working conditions that may lead to Acute Reactions, or strains in the worker.” We used two different sets of job stress indicators. The First set was the Occupational Stress Index (OSI). [31-42] This index is based on an additive burden model that focuses on work stressors and integrates essentials of Job Strain Model [43] with an attempt to capture stress at work. [31-42] [44]

The second types of stress domain examined were based on the results from qualitative study.[45] The stress domains comprised Time pressure, length of experience, Shift, Income, job Control, Autonomy, Appreciation, Physical environment, Work Environment and Emotional stressors. A detailed description of job stressors is provided in earlier chapters on methods and qualitative study.[25, 45]

Musculoskeletal symptoms

We used the standardized Nordic questionnaire[46, 47] for assessing musculoskeletal symptoms.[48] This standardized questionnaire contains items identifying areas of the body causing musculoskeletal problems. Symptoms in nine sites of the body were assessed, ; neck, shoulders, upper back, elbows, low back, wrist/hands, hips/thighs, knees and ankles/feet. Respondents had to answer if they have had any musculoskeletal trouble in the last 12 months preventing their normal activity, which were defined as chronic musculoskeletal symptoms. Similarly the responses to musculoskeletal symptoms in the last 7 days were termed as acute musculoskeletal symptoms. This questionnaire has been validated in several countries including India and the studies have concluded that this was acceptable as a screening tool. [49-56] Existing information was used to classify the severity of chronic and acute musculoskeletal symptoms of head, eye, neck, shoulder, elbow, wrist, upper and lower back, hip, knee and ankle.

We also calculated composite chronic musculoskeletal score that combines chronic musculoskeletal symptoms for all the parts mentioned above and a composite acute score that combines acute musculoskeletal symptoms for all parts. We illustrate recoding of chronic score for one part, the head, here. The questionnaire contained three questions regarding symptoms related to head. The *first question* asked whether the worker at any time during the last 12 months had trouble (such as ache, pain, discomfort, numbness) in their head. *The second* question inquired whether during the past 12 months, they had been prevented from carrying out normal activities (housework, hobbies, work) because of this trouble. The third question asked whether during the past 12 months, they had seen a physician for this condition. If the answer to all three questions on headache was yes, then it will be recoded as level 5, reflecting severity. If there was as ache, pain, discomfort, numbness and the person had to see a doctor for it, (yes to 1 and 3 but no to 2), then it is coded as 4. If answer to first two questions is yes and

third is no, then it is coded as 3. If the answer to first question is yes and no to next two questions, then it is coded as 2. The code 1 is given who said no to all three questions.

Finally chronic and acute musculoskeletal scores were calculated by combing the scores of all the parts to a total combined score of 100. The formula is as given below

Chronic musculoskeletal score = (Sum of chronic score for all eleven parts/11)* 20 Acute musculoskeletal score = (Sum of acute score for all eleven parts/11)* 20

Confounders

We included waist by hip circumference, past medical history, gender, age (continuous), socio economic status (continuous), marital status, tobacco use, alcohol and regular exercises for at least 20 minutes as confounders. A detailed description of the measures about confounders is provided in earlier chapters on methods. [25, 53]

Analysis:

Initially, variables were recoded in increasing order of contextual stress increases if they are concerned with stress, increased musculoskeletal symptom, increasing quality of life across their respective gradations. Newly coded variables were created in the dataset for further analysis. The data from the cross sectional survey was analyzed using SAS 9.1.3104[57] A detailed analysis plan is explained in Chapter.2. [53, 57] We present brief details pertaining to this chapter. The data from the cross sectional survey was analyzed using SAS 9.1.3104[57]

We used ordinal logistic regression in this study. For this purpose, we had created tertiles of stress domains (Y) as ordinals, Low, Moderate and High levels of stress. We didn't use polytomous logistic regression, as this model does not make use of the information about the

ordering. Hence, alternatively, to take account of the ordering obtained from contextual stress domains and data management, we used cumulative probabilities (interrelated to cumulative odds and cumulative logits) model.[58] [59]

For (k+l) ordered categories, these quantities are defined as follows

$$P(Y \le i) = p_1 + p_2 + \ldots + p_i$$
$$odds(Y \le i = i) = [(P(Y \le i) / (1 - P(Y \le i)] = [(p_1 + p_2 + \ldots + p_l)/(p_{l+1} + \ldots + p_{k+1})]$$
$$logit(Y \le i = i) = ln[(P(Y \le i) / (1 - P(Y \le i)], \; i = 1, \ldots, k$$

The cumulative logistic model for outcomes arranged in ordinal categories is given by

$$Logit(Y \le i = i) = \alpha, + p_i X. + \ldots + p_{im} X_m, \; i = l, \ldots, k$$

The model has k model equations and one logistic coefficient b_{ij}, for each category/covariate combination. The general cumulative logistic regression model therefore contains a large number of parameters. A more parsimonious model can be thought of when the logistic coefficients do not depend on *i* and we have only one common parameter b_{ij} for each covariate. Based on this, the cumulative odds are given by

$$Odds(Y \le i = i) = exp(\alpha,) \; exp(\beta_i X_i + \ldots + \beta_m X_m) \;, \; i = l, \ldots, k$$

This model suggests that the k odds for each cut-off category i differ only with regard to the intercepts α_i.

Results

1369 IT/ITES professionals were invited to participate in the study. The refusal rate was 4.7% (n=64). The details of selection and completeness are provided in chapter.4. In brief, 13% professionals didn't return the questionnaire a further 4.6% were found ineligible based on the inclusion criteria. The total refusal rate was 18%. Among the eligible subjects (1071), we conducted the analysis regarding Job stress and Quality of Life that included 599 IT professionals and 472 ITES professionals.

Descriptive analyses of domains of quality of life among workers are presented inTable.1. Out of 1071 participants, 55% of them reported of having moderate quality of physical life. Nearly 40% rated their quality of psychological life as moderate and 35% rated it as poor. Regarding quality of environmental life, 46% and 40% of the participants had moderate and poor quality of environmental life respectively. 60% of the subjects had rated their quality of social life as moderate.

Distributions of musculoskeletal symptoms as reported by participants are presented in Table.2. Out of 1071 workers, the proportion with chronic symptoms at moderate or higher level for head was 24%, chronic eye symptoms 19% and chronic neck symptoms 18%. The proportion of moderate or higher level of chronic symptoms for shoulders was 15%, elbow was 56% and wrists was 56%. The proportion of moderate or higher level of chronic symptoms for upper back was 56%, lower back was 19%, hips was 56%, knees was 57% and ankles was 56%.
On estimating the chronic Musculo-skeletal score, it was found that 70% had low score, 21% had moderate chronic symptom score and 9% had high score. However, a greater proportion of IT/ITES professionals had acute musculoskeletal scores with moderate degree being 44% and high level at 12%.

Descriptive analyses of coping mechanisms for relieving musculoskeletal symptoms as mentioned by workers are presented in Table.3. Nearly 50% of the workers reported that they would attempt seeking help sometimes during handling heavy objects, 55% modified their position/posture sometimes in order to get relief from musculoskeletal symptom, only 15% almost always used a different part of his/her body to do a skilled job, 48% did some warm up or stretches sometimes before performing some strenuous activity while 30% almost never did, 54% sometimes paused regularly while working, 48% adjusted the height of the chair

sometimes before starting work, 53% workers adapted techniques sometimes that did not aggravate symptoms and 48% sometimes stopped work if it caused or aggravated pain.

Unadjusted and adjusted associations of quality of life and higher occupational stress index (OSI) are presented in Table.4. In the unadjusted model, participants with moderate and good levels of physical quality of life were found to be associated with higher occupational stress index. These associations became stronger when we adjusted for gender, marital status, ever use of tobacco, alcohol drinking, exercise habit, socio-economic condition, nutritional status and family history for chronic illnesses. Subjects with good level of psychological quality of life had 93% and 71% higher odds of having higher occupational stress index in unadjusted and adjusted models respectively. Those with moderate and good environmental and social quality of life were more likely to have higher occupational stress index in both unadjusted and adjusted models

In the adjusted model, subjects with a good level of environmental quality of life had 49% higher odds of suffering from higher occupational stress related to time pressure. (Table.5) There was no association between any domain of quality of life and occupational stress related to longer duration of experience. (Table.6)

Crude and adjusted associations of quality of life and higher shift related stress factors are presented in Table.7. Subjects having good physical quality of life were found to be associated with higher occupational stress related to shift factors both in unadjusted and adjusted analysis. In adjusted model, participants with good psychological quality of life had 62% higher odds of having higher shift related stress factors. There was a crude association between workers reporting moderate environmental quality of life and higher shift related stress factors, which was also observed after adjustment.

Unadjusted and adjusted associations of quality of life and higher income related stress factors are presented in Table.8. Subjects with good psychological quality of life were more likely to have higher occupational stress related to income, which was also observed after adjustment. Those with moderate and good environmental and social quality of life were more likely to have higher income related stress factors in both unadjusted and adjusted models.

Unadjusted and adjusted associations of quality of life and higher job control related stress factors are presented in Table.9. Participants reporting good quality of physical life were more likely to have higher occupational stress related to job control. Having moderate and good environmental quality of life was found to be associated with higher stress related to job control and these associations remained same on adjustment for moderate. Subjects with good social quality of life had 93% higher odds of having higher job control related stress and when we did adjustment, both moderate and good social quality of life were found to associated with higher job control related stress.

Crude and adjusted analyses between quality of life and higher autonomy related stress factors are presented in Table. 10. Subjects reporting good physical and psychological quality of life were found to be associated with higher occupational stress related to autonomy in both unadjusted and adjusted models. In addition, participants with moderate and good quality of environmental life were more likely to have higher autonomy related stress and on adjustment we got similar results. Having moderate and good social quality of life was found to be associated with higher autonomy related job stress and on adjustment only good social quality of life showed positive association with higher autonomy related job stress.

Table.11 shows unadjusted and adjusted associations of quality of life and higher job stress related to appreciation. In comparison to subjects with corresponding poor level of QOL, those

having moderate and good physical and environmental quality of life were more likely to suffer from higher appreciation related stress in crude analysis and adjusted models. Participants with good quality of psychological quality of life were 2.19 times likely to suffer from higher appreciation related occupational stress and we got almost similar results on adjustment. In addition, subjects with moderate and good social quality of life were found to be associated with higher appreciation related stress but on adjustment only good social quality of life was found to be associated with higher appreciation related job stress.

Table. 12 provide results of crude and adjusted analyses of associations between quality of life and higher job stress related to physical environment. In comparison to workers reporting poor QOL, workers having moderate and good physical, psychological, environmental and social QOL, all were found to have positive associations with higher occupational stress related to physical environment in both unadjusted and adjusted models.

Unadjusted and adjusted associations between quality of life and occupational stress related to work environment are presented in Table. 13. Participants with moderate and good physical and environmental quality of life had higher odds of suffering from higher appreciation related stress in crude analysis and adjusted models. Subjects reporting good psychological quality of life were 1.49 times likely to suffer from higher job stress related to work environment but on adjustment no association was observed. Having moderate and good quality of social life were found to be associated with higher occupational stress related to work environment and when we did adjusted analysis, only subjects having good quality of social life showed positive association.

Table 14 provides results of crude and adjusted analyses of associations between quality of life and occupational stress related to emotion. In comparison to workers reporting poor QOL,

workers having moderate and good physical, psychological for moderate and crude, environmental and social QoL, all were found to have positive associations with higher occupational stress related to emotion in both unadjusted and adjusted models.

The pattern of association between all the domains of stress and all the domains of quality of life is provided in figure.1. The moderate levels of stress in the domains of work environment, income, affect, job control are strongly associated with better quality of life in that order. The strongest association between quality of life is seen with high work environment stressors, OSI and physical environmental stressors. The strength of relationship decreases with higher levels of autonomy stressors, job control and income stressors.

Discussion

The association between computer work environment and health has been studied earlier. [60-64] Mostly, these studies focused on assessing physical and mental health in work settings. [65-68] There is not enough literature available on association between job stress and quality of life. [69] This study explored to investigate the musculoskeletal symptoms and quality of life in software industry of Bangalore.

In a study done among computer professionals in Delhi, nearly three-fourths of the respondents had musculoskeletal problems.[26] This study also showed that visual problems were directly related to average computer hours per day. Visual problems were less in persons using an antiglare screen, and those with adequate lighting in the room. This could mean that putting emphasis on ergonomic conditions under which computer-related work is being performed, can go a long way in reducing the burden of visual problems. Musculoskeletal problems were greater in professionals working for a longer time per day, and were found to be significantly lesser among those using cushioned chairs and soft keypad. [26] In a study done by Sharma et

al,[70], the common symptoms were pain (55%) and stiffness (14.8%) and common sites affected were neck (44%), low back (30.5%), wrist/hand (19%) and shoulders (12.5%).

With reference to acute musculoskeletal symptoms, the results from our study are in conformity with Indian studies by Sharma et al,[70] who reported 93% of the subjects having one or more than one MS (musculoskeletal symptoms), Shah et al [71] where 94% software professionals, had one or more problems. From international evidence, our results are in agreement with study done by Peper and Gibney [72], who reported 97% if college students reporting some discomfort while, Sjogren-Rouka et al [73] reported 92%. In a meta-analysis done by Lim et al [74, 75] and WHO suggest the prevalence proportion of Work related musculoskeletal symptoms (WMS) is between 14-75%. This wide range in the prevalence proportion of MSS may be due to heterogeneity of work environment, proportion of people doing regular exercise, level of knowledge, attitude and practice towards MSS by IT/ITES professionals. Our study results are consistent with the study by Talwar [26] and Bhatt.[76]

The prevalence of various WMS involving human-computer interface are determined by several factors. These include type of profession, work environment, posture adopted, exercises and relaxation techniques.[21, 77, 78] Further, the evidence from earlier studies suggests that position of monitor & keyboard, exhaustion, overuse, and lack of ergonomic knowledge also play an important role. [21, 79] One of the most important determinant in alleviating musculoskeletal symptoms is physical activity and IT/ITES professionals work tasks involve little or no physical activity.[65] Earlier studies have concluded that the high prevalence of WMS is due to lack of ergonomics principles to improve efficiency and comfort.[80],[81] We found that more than half of subjects suffer from some acute musculoskeletal symptom. More than half of IT/ITES professionals had chronic symptoms for elbows, wrists, upper back, knees and ankle.

Our results indicated all the domains (physical, psychological, social and environmental) of quality of life showed statistically significant positive associations with increasing stress domains of autonomy, physical infrastructure, work environment and emotional factors. Barring psychological domain of QoL, all the other domains were associated with job control. There was positive association seen in the relation between environmental domain with time pressure and appreciation stressors. All domains except social QoL were affected stress related to shift work and all the domains except physical QoL affected income related stress. In summary, our results indicated that higher quality of life was associated with moderate to high levels of stress. There can be several possible reasons for these findings.

First, "Yerkes-Dodson law" states that "As the difficultness of discrimination is increased the strength of that stimulus which is most favorable to habit formation approaches the threshold."[82-85] An interpretation of this law suggests that there is an inverted U relationship between quality of life achieved through efficiency of coping and arousal due to stress. [82-85] Deducing this logic, the peak accomplishment of quality of life probably happens by stimulus of moderate-high levels of job stressors, which facilitate transformation. [82-85] Also, very low levels of job stress might lead mix-up of extraneous and pertinent cues and hence there may not be any change towards better quality of life. [82] In support of the above, Hans Selye coined the term "Eustress" or "good stress",[86] indicating common benefit accrued by stress till certain levels. After crossing threshold level, stress would turn into "distress".[87-89]

Second, it is possible that workers experiencing high levels of stress dropped out of the study and therefore survivor bias might have affected the results. Those who could handle stress well continue to work and advance to higher levels.

Third, the cause of stress (eustress of distress) is not a simple consequence to exposure to stressors alone, as the perception of stressor by individuals plays a greater role.[90-92] “Sense of coherence” (SOC) is a term used as an explanation why individual perceive stresses differently. According to Antonovsky, the term SOC is defined as “a global orientation that expresses the extent to which one has a pervasive, enduring though dynamic feeling of confidence” that the world is meaningful, understandable, and manageable.[93, 94] The confidence gained through confronting the stressors may have been reflected through the positive subjective affirmation of the domains of quality of life.[90, 95]

Fourth, it is possible that extraneous variables connecting job stress and quality of life might be responsible for the observed association. The three possible domains that have bearing on determining the quality of life in individuals are health of individuals, their general level of satisfaction, personal values, income and aspirations. Health of the individual in terms of their physical, mental, social and emotional well-being. Perceptions about their quality of life is another determinant as one may be perfectly healthy and still feel sick either because of inability to appreciate the healthiness of self. Similarly, perceptual differences might make the feel based on what they believe in is true, which might be different than objective status in their life. This domain can be called as satisfaction with objective attainments. In general, the professionals working in IT/ITES industry appear to be satisfied with their life.

Fifth, personal values and aspirations also play a greater role in determining quality of life.[96-99] Professionals who reach the top or perform well are those who cope successfully with work pressures. As a result, they will have better quality of life in most aspects. Job insecurity and constant need to upgrade skills are two of such factors found in literature. [100] Job insecurity is a condition wherein employees lack the assurance that their jobs will remain stable and is

characterized by the uncertainty around keeping the job.[101],[102-106] Employees engaged in IT/ITES sector have to work at their best for lowering their job insecurity. [107-109],[14-18]

There is evidence that the work involved in IT/ITES sector involves greater innovation resulting in engagement with creative tasks, which are associated with both stressors and with physical domain, social domain and emotional domains with quality of life.[14, 19, 20, 23, 110-112] The age of the professionals included in the study were very young and contained predominately males. This finding is similar to other studies done in India.[65, 66] Jha et al reported age as most important predictor associated with all domains of quality of life among software professionals.[6] The authors also inferred that the reason for better QoL among IT professionals could be explained by their length of experience within the industry professionals that could have better acclimatized to the work environment.

Finally, protective family, social and psychosocial environment might be the reason for correlation with both higher stress and quality of life. There is evidence suggesting that social support may reduce conflict, time pressure and ambiguity.[113] Parental demands, satisfaction in marital relations and family conflicts interact with job stressors and influence overall satisfaction with life.[114] [115, 116].

Strengths and Limitations

The strengths of this study are that the sample size was large, captured most aspects of socio-demographic characteristics, used validated questionnaire for assessing occupational stress and quality of life. Our study indicated that there is a strong relationship between higher quality of life and moderate-high levels of stress. This relationship was evident for all the four domains of quality of life.

Nonetheless, there are some limitations in the study. Due to cross sectional nature of the study, the positive associations do not suggest causality, as temporal ambiguity cannot be ruled out. Also, our study did not measure coping mechanisms such as sense of coherence and personality characteristics, which mediate the pathway of stress and quality of life. As inherent to any cross sectional study, we cannot rule out selection bias and confounding playing their role in causing some bias in the reported association. Also, all the measurements were based on self-reporting of IT/ITES professionals, and the direction of their assessment might have taken the bias in any direction.

Summary and Future Directions

Most of the evidence regarding QoL including ours has been based out of cross-sectional studies. Hence, temporal ambiguity is a major limitation. Prospective examination through cohort studies will aid in establishing temporality of this association. Due caution will have to be exercised while interpreting our results or in applying to other occupational settings.

Notwithstanding the limitations, our research provides a rare insight into an extremely unexplored, yet demanding, occupational setting. Job stress is associated with higher income, higher control job categories which pay better. The respondents clearly found the trade off of higher stress to be acceptable for the increased quality of life they enjoyed. It is also possible that eustress might actually be responsible for improvements in quality of life either directly or through mediation of variables such as personal values and aspirations, personality characteristics, income and others. Only future studies can provide conclusive evidence towards this.

Our study also found high prevalence of musculoskeletal symptoms in IT/ITES professionals. It is important to delineate the ergonomic characteristics at workplace and how these are related

to musculoskeletal problems. There is a need for introduction of better ergonomic approach while designing the workspaces and incorporating regular exercises as part of the routine activity. Reductions in stress levels and musculoskeletal symptoms should be the priority of employers and most efficient way of doing this can be through integrating prevention into industrial practices.

Tables

Table.1.Descriptive Table of domains of quality of life

Domains of quality of Life	Sample size	**Levels of QoL**	**Freq.**	**%**	**95% Conf. Interval**
Physical Quality of Life	1071	Good	303	28.29	(25.59 – 31.0)
		Moderate	589	55.00	(52.02 - 57.98)
		Poor	179	16.71	(14.48 - 18.96)
Psychological Quality of Life	1071	Good	377	35.20	(32.34 - 38.07)
		Moderate	432	40.34	(37.4 - 43.28)
		Poor	262	24.46	(21.89 - 27.05)
Environmental Quality of Life	1071	Good	432	40.34	(37.4 - 43.28)
		Moderate	496	46.31	(43.33 - 49.31)
		Poor	143	13.35	(11.32 - 15.4)
Social Quality of Life	1071	Good	280	26.14	(23.51 - 28.78)
		Moderate	643	60.04	(57.1 - 62.98)
		Poor	148	13.82	(11.75 - 15.89)

Table.2.Description of musculoskeletal symptoms

Musculoskeletal symptoms	Number	Levels of symptoms	Frequency	%	[95%Conf.Interval]
Chronic symptoms of Head	**1071**	Low	812	75.82	(73.25 - 78.39)
		Moderate	145	13.54	(11.49 - 15.6)
		High	114	10.64	(8.8 - 12.5)
Chronic symptoms of Eye	**1071**	Low	874	81.61	(79.29 - 83.93)
		Moderate	113	10.55	(8.71 - 12.4)
		High	84	7.84	(6.24 - 9.46)
Chronic symptoms of Neck	**1071**	Low	878	81.98	(79.68 - 84.29)
		Moderate	138	12.89	(10.88 - 14.9)
		High	55	5.14	(3.82 - 6.46)
Chronic symptoms of Shoulders	**1071**	Low	909	84.87	(82.73 - 87.03)
		Moderate	112	10.46	(8.63 - 12.3)
		High	50	4.67	(3.41 - 5.94)
Chronic symptoms of Elbows	**1071**	Low	469	43.79	(40.82 - 46.77)
		Moderate	535	49.95	(46.96 - 52.96)
		High	67	6.26	(4.81 - 7.71)
Chronic symptoms of Wrists / Hands	**1071**	Low	468	43.70	(40.73 - 46.68)
		Moderate	482	45.00	(42.03 - 47.99)
		High	121	11.30	(9.4 - 13.2)
Chronic symptoms of Upper Back	**1071**	Low	470	43.88	(40.91 - 46.87)
		Moderate	469	43.79	(40.82 - 46.77)
		High	132	12.32	(10.36 - 14.3)
Chronic symptoms of Lower Back	**1071**	Low	859	80.21	(77.82 - 82.6)
		Moderate	144	13.45	(11.4 - 15.5)
		High	68	6.35	(4.89 - 7.82)
Chronic symptoms of Hips	**1071**	Low	473	44.16	(41.19 - 47.15)
		Moderate	533	49.77	(46.77 - 52.77)
		High	65	6.07	(4.64 - 7.51)
Chronic symptoms of Knees	**1071**	Low	466	43.51	(40.54 - 46.49)
		Moderate	499	46.59	(43.6 - 49.59)
		High	106	9.90	(8.11 - 11.69)
Chronic symptoms of ankles	**1071**	Low	475	44.35	(41.38 - 47.34)
		Moderate	521	48.65	(45.65 - 51.65)
		High	75	7.00	(5.48 - 8.54)
Chronic Musculo-Skeletal score	**1071**	Low	748	69.84	(67.09 - 72.6)
		Moderate	225	21.01	(18.57 - 23.46)
		High	98	9.15	(7.43 - 10.88)
Acute Musculo-Skeletal score	**1071**	Low	471	43.98	(41.01 - 46.96)
		Moderate	467	43.60	(40.63 - 46.58)
		High	133	12.42	(10.44 - 14.4)

Table.3.Descriptive Table of coping mechanisms for relieving musculoskeletal symptoms

Coping mechanisms	Sample size	Tabulation	Almost Always	Some Times	Almost Never
Will receive some help to handle a heavy object	1005	Freq & %	126 (12.54)	494 (49.16)	385 (38.31)
		95% CI	(10.49 - 14.59)	(46.06 - 52.26)	(35.3 - 41.32)
		Std. Err.	1.05	1.58	1.53
Modify one's position or posture	1026	Freq & %	271 (26.42)	557 (54.29)	198 (19.3)
		95% CI	(23.72 - 29.12)	(51.24 - 57.35)	(16.88 - 21.72)
		Std. Err.	1.38	1.56	1.23
Use a different part of my body to do a skilled Job	992	Freq & %	146 (14.72)	425 (42.85)	421 (42.44)
		95% CI	(12.51 - 16.93)	(39.76 - 45.93)	(39.36 - 45.53)
		Std. Err.	1.13	1.57	1.57
Warm up and stretch before performing strenuous activity	1010	Freq & %	230 (22.78)	478 (47.33)	302 (29.91)
		95% CI	(20.19 - 25.37)	(44.25 - 50.42)	(27.08 - 32.73)
		Std. Err.	1.32	1.57	1.44
Pause regularly while working	992	Freq & %	226 (22.79)	529 (53.33)	237 (23.9)
		95% CI	(20.17 - 25.4)	(50.22 - 56.44)	(21.24 - 26.55)
		Std. Err.	1.33	1.58	1.35
Adjust height of chair before starting work	1014	Freq & %	336 (33.14)	479 (47.24)	199 (19.63)
		95% CI	(30.24 - 36.04)	(44.17 - 50.32)	(17.18 - 22.08)
		Std. Err.	1.48	1.57	1.25
Adapt techniques that do not aggravate symptoms	1003	Freq & %	242 (24.13)	528 (52.65)	233 (23.24)
		95% CI	(21.48 - 26.78)	(49.55 - 55.74)	(20.62 - 25.85)
		Std. Err.	1.35	1.58	1.33
Stop a work if it causes or aggravates discomfort	1024	Freq & %	261 (25.49)	491 (47.95)	272 (26.57)
		95% CI	(22.82 - 28.17)	(44.89 - 51.02)	(23.86 - 29.28)
		Std. Err.	1.36	1.56	1.38

Table. 4: Estimates of quality of life and Occupational Stress Index

Physical QOL	Unadjusted OR	Poor	Reference		
		Moderate	1.40[#]	(1.08 - 1.85)	0.01
		Good	1.89	(1.32 - 2.72)	0.00
	Adjusted * OR	Poor	Reference		
		Moderate	**1.45**	**(1.12 - 1.88)**	**0.00**
		Good	**2.05**	**(1.45 - 2.91)**	**<.0001**
Psychological QOL	Unadjusted	Poor	Reference		
		Moderate	1.11	(0.85 - 1.45)	0.46
		Good	**1.93**	**(1.41 - 2.64)**	**<.0001**
	Adjusted*	Poor	Reference		
		Moderate	1.06	(0.82 - 1.37)	0.68
		Good	**1.71**	**(1.28 - 2.31)**	**0.00**
Environmental QOL	Unadjusted	Poor	Reference		
		Moderate	2.07	(1.6 - 2.67)	**<.0001**
		Good	3.18	(2.18 - 4.66)	**<.0001**
	Adjusted*	Poor	Reference		
		Moderate	**2.06**	**(1.62 - 2.63)**	**<.0001**
		Good	**3.37**	**(2.34 - 4.86)**	**<.0001**
Social QOL	Unadjusted	Poor	Reference		
		Moderate	1.37	(1.05 - 1.81)	0.02
		Good	2.12	(1.43 - 3.16)	0.00
	Adjusted*	Poor	Reference		
		Moderate	**1.37**	**(1.06 - 1.78)**	**0.02**
		Good	**2.33**	**(1.6 - 3.41)**	**<.0001**

*Adjusted estimates obtained after controlling for gender, marital status, ever use of tobacco, alcohol drinking, exercise habit, socio-economic condition, nutritional status and family history for chronic illnesses

Odds of having a higher level of occupational stress index

Table. 5: Estimates of quality of life and Time pressure

Physical QOL	Unadjusted	Poor	Reference		
		Moderate	0.98#	(0.75 - 1.3)	0.90
		Good	1.01	(0.7 - 1.47)	0.95
	Adjusted*	Poor	Reference		
		Moderate	1.06	(0.82 - 1.39)	0.65
		Good	1.08	(0.76 - 1.54)	0.69
Psychological QOL	Unadjusted	Poor	Reference		
		Moderate	0.99	(0.75 - 1.31)	0.93
		Good	1.08	(0.79 - 1.49)	0.64
	Adjusted*	Poor	Reference		
		Moderate	0.98	(0.75 - 1.28)	0.87
		Good	1.06	(0.78 - 1.44)	0.73
Environmental QOL	Unadjusted	Poor	Reference		
		Moderate	0.97	(0.75 - 1.26)	0.83
		Good	1.39	(0.94 - 2.06)	0.10
	Adjusted*	Poor	Reference		
		Moderate	1.05	(0.82 - 1.35)	0.71
		Good	**1.49**	**(1.03 - 2.17)**	**0.04**
Social QOL	Unadjusted	Poor	Reference		
		Moderate	1.18	(0.9 - 1.57)	0.24
		Good	1.16	(0.78 - 1.75)	0.47
	Adjusted*	Poor	Reference		
		Moderate	1.20	(0.92 - 1.57)	0.19
		Good	1.20	(0.82 - 1.77)	0.35

*Adjusted estimates obtained after controlling for gender, marital status, ever use of tobacco, alcohol drinking, exercise habit, socio-economic condition, nutritional status and family history for chronic illnesses

Odds of having a higher level of occupational stress index

Table. 6: Estimates of quality of life and length of experience

Physical QOL	Unadjusted	Poor	Reference		
		Moderate	0.97[#]	(0.68 - 1.39)	0.87
		Good	1.05	(0.65 - 1.7)	0.85
	Adjusted*	Poor	Reference		
		Moderate	0.96	(0.69 - 1.35)	0.82
		Good	1.15	(0.73 - 1.83)	0.55
Psychological QOL	Unadjusted	Poor	Reference		
		Moderate	0.96	(0.69 - 1.37)	0.83
		Good	1.37	(0.9 - 2.1)	0.14
	Adjusted*	Poor	Reference		
		Moderate	0.97	(0.7 - 1.36)	0.88
		Good	1.34	(0.9 - 2)	0.15
Environmental QOL	Unadjusted	Poor	Reference		
		Moderate	1.18	(0.85 - 1.65)	0.32
		Good	1.17	(0.72 - 1.9)	0.53
	Adjusted*	Poor	Reference		
		Moderate	1.24	(0.91 - 1.7)	0.18
		Good	1.14	(0.72 - 1.8)	0.59
Social QOL	Unadjusted	Poor	Reference		
		Moderate	1.05	(0.74 - 1.51)	0.79
		Good	0.96	(0.58 - 1.6)	0.87
	Adjusted*	Poor	Reference		
		Moderate	1.05	(0.75 - 1.48)	0.78
		Good	0.96	(0.6 - 1.56)	0.88

*Adjusted estimates obtained after controlling for gender, marital status, ever use of tobacco, alcohol drinking, exercise habit, socio-economic condition, nutritional status and family history for chronic illnesses

Odds of having a higher level of occupational stress index

Table. 7: Estimates of quality of life and Shift related stress factors

Physical QOL	Unadjusted	Poor	Reference		
		Moderate	1.11[#]	(0.79 - 1.59)	0.55
		Good	**1.80**	**(1.07 - 3.04)**	**0.03**
	Adjusted*	Poor	Reference		
		Moderate	1.10	(0.79 - 1.54)	0.58
		Good	**1.74**	**(1.07 - 2.86)**	**0.03**
Psychological QOL	Unadjusted	Poor	Reference		
		Moderate	0.95	(0.68 - 1.36)	0.79
		Good	1.42	(0.92 - 2.2)	0.11
	Adjusted*	Poor	Reference		
		Moderate	1.01	(0.73 - 1.4)	0.98
		Good	**1.62**	**(1.08 - 2.46)**	**0.02**
Environmental QOL	Unadjusted	Poor	Reference		
		Moderate	**1.62**	**(1.16 - 2.28)**	**0.00**
		Good	1.46	(0.9 - 2.4)	0.13
	Adjusted*	Poor	Reference		
		Moderate	**1.58**	**(1.15 - 2.17)**	**0.01**
		Good	1.49	(0.93 - 2.39)	0.10
Social QOL	Unadjusted	Poor	Reference		
		Moderate	1.15	(0.81 - 1.65)	0.44
		Good	1.46	(0.86 - 2.52)	0.17
	Adjusted*	Poor	Reference		
		Moderate	1.13	(0.81 - 1.59)	0.47
		Good	1.44	(0.87 - 2.41)	0.16

*Adjusted estimates obtained after controlling for gender, marital status, ever use of tobacco, alcohol drinking, exercise habit, socio-economic condition, nutritional status and family history for chronic illnesses

Odds of having a higher level of occupational stress index

Table. 8: Estimates of quality of life and Income related stress factors

Physical QOL	Unadjusted	Poor	Reference		
		Moderate	1.05[#]	(0.8 - 1.38)	0.75
		Good	1.23	(0.85 - 1.8)	0.27
	Adjusted*	Poor	Reference		
		Moderate	1.01	(0.78 - 1.32)	0.96
		Good	1.19	(0.83 - 1.7)	0.35
Psychological QOL	Unadjusted	Poor	Reference		
		Moderate	1.22	(0.93 - 1.6)	0.16
		Good	**1.81**	**(1.31 - 2.51)**	**0.00**
	Adjusted*	Poor	Reference		
		Moderate	1.20	(0.92 - 1.56)	0.18
		Good	**1.63**	**(1.2 - 2.22)**	**0.00**
Environmental QOL	Unadjusted	Poor	Reference		
		Moderate	**1.62**	**(1.26 - 2.1)**	**0.00**
		Good	**2.01**	**(1.36 - 2.98)**	**0.00**
	Adjusted*	Poor	Reference		
		Moderate	**1.51**	**(1.18 - 1.94)**	**0.00**
		Good	**1.90**	**(1.31 - 2.77)**	**0.00**
Social QOL	Unadjusted	Poor	Reference		
		Moderate	**1.42**	**(1.08 - 1.87)**	**0.01**
		Good	**2.14**	**(1.42 - 3.25)**	**0.00**
	Adjusted*	Poor	Reference		
		Moderate	**1.32**	**(1.02 - 1.73)**	**0.04**
		Good	**1.88**	**(1.27 - 2.79)**	**0.00**

*Adjusted estimates obtained after controlling for gender, marital status, ever use of tobacco, alcohol drinking, exercise habit, socio-economic condition, nutritional status and family history for chronic illnesses

Odds of having a higher level of occupational stress index

Table. 9: Estimates of quality of life and job Control stress

Physical QOL	Unadjusted	Poor	Reference		
		Moderate	1.22#	(0.93 - 1.61)	0.16
		Good	**1.66**	**(1.15 - 2.4)**	**0.01**
	Adjusted*	Poor	Reference		
		Moderate	1.20	(0.92 - 1.56)	0.18
		Good	**1.66**	**(1.17 - 2.37)**	**0.00**
Psychological QOL	Unadjusted	Poor	Reference		
		Moderate	1.02	(0.78 - 1.35)	0.87
		Good	1.24	(0.91 - 1.7)	0.18
	Adjusted*	Poor	Reference		
		Moderate	0.94	(0.72 - 1.22)	0.61
		Good	1.15	(0.86 - 1.55)	0.36
Environmental QOL	Unadjusted	Poor	Reference		
		Moderate	**1.54**	**(1.19 - 1.99)**	**0.00**
		Good	**2.60**	**(1.77 - 3.84)**	**<.0001**
	Adjusted*	Poor	Reference		
		Moderate	**1.62**	**(1.27 - 2.07)**	**0.00**
		Good	**2.65**	**(1.83 - 3.83)**	**<.0001**
Social QOL	Unadjusted	Poor	Reference		
		Moderate	1.25	(0.95 - 1.65)	0.12
		Good	**1.93**	**(1.3 - 2.9)**	**0.00**
	Adjusted*	Poor	Reference		
		Moderate	**1.32**	**(1.02 - 1.73)**	**0.04**
		Good	**2.03**	**(1.39 - 2.98)**	**0.00**

*Adjusted estimates obtained after controlling for gender, marital status, ever use of tobacco, alcohol drinking, exercise habit, socio-economic condition, nutritional status and family history for chronic illnesses

Odds of having a higher level of occupational stress index

Table. 10: Estimates of quality of life and Autonomy stressors

Physical QOL	Unadjusted	Poor	Reference		
		Moderate	1.26[#]	(0.95 - 1.67)	0.11
		Good	**1.45**	**(1 - 2.12)**	**0.05**
	Adjusted*	Poor	Reference		
		Moderate	1.29	(0.99 - 1.68)	0.07
		Good	**1.50**	**(1.05 - 2.15)**	**0.03**
Psychological QOL	Unadjusted	Poor	Reference		
		Moderate	1.05	(0.8 - 1.4)	0.71
		Good	**1.83**	**(1.33 - 2.55)**	**0.00**
	Adjusted*	Poor	Reference		
		Moderate	0.98	(0.76 - 1.29)	0.90
		Good	**1.67**	**(1.23 - 2.29)**	**0.00**
Environmental QOL	Unadjusted	Poor	Reference		
		Moderate	**2.06**	**(1.58 - 2.69)**	**<.0001**
		Good	**2.57**	**(1.73 - 3.81)**	**<.0001**
	Adjusted*	Poor	Reference		
		Moderate	**1.98**	**(1.54 - 2.55)**	**<.0001**
		Good	**2.54**	**(1.74 - 3.7)**	**<.0001**
Social QOL	Unadjusted	Poor	Reference		
		Moderate	**1.39**	**(1.05 - 1.84)**	**0.02**
		Good	**1.95**	**(1.29 - 2.95)**	**0.00**
	Adjusted*	Poor	Reference		
		Moderate	1.27	(0.98 - 1.67)	0.08
		Good	**1.88**	**(1.27 - 2.78)**	**0.00**

*Adjusted estimates obtained after controlling for gender, marital status, ever use of tobacco, alcohol drinking, exercise habit, socio-economic condition, nutritional status and family history for chronic illnesses

Odds of having a higher level of occupational stress index

Table. 11: Estimates of quality of life and Appreciation stressors

Physical QOL	Unadjusted	Poor	Reference		
		Moderate	**1.54[#]**	**(1.18 - 2.03)**	**0.00**
		Good	**1.75**	**(1.21 - 2.54)**	**0.00**
	Adjusted*	Poor	Reference		
		Moderate	**1.50**	**(1.16 - 1.95)**	**0.00**
		Good	**1.69**	**(1.19 - 2.42)**	**0.00**
Psychological QOL	Unadjusted	Poor	Reference		
		Moderate	1.19	(0.91 - 1.57)	0.21
		Good	**2.19**	**(1.58 - 3.04)**	**<.0001**
	Adjusted*	Poor	Reference		
		Moderate	1.17	(0.9 - 1.52)	0.24
		Good	**2.04**	**(1.5 - 2.79)**	**<.0001**
Environmental QOL	Unadjusted	Poor	Reference		
		Moderate	**1.37**	**(1.07 - 1.78)**	**0.01**
		Good	**2.34**	**(1.57 - 3.5)**	**<.0001**
	Adjusted*	Poor	Reference		
		Moderate	**1.36**	**(1.07 - 1.74)**	**0.01**
		Good	**2.52**	**(1.71 - 3.71)**	**<.0001**
Social QOL	Unadjusted	Poor	Reference		
		Moderate	**1.34**	**(1.03 - 1.77)**	**0.04**
		Good	**2.39**	**(1.57 - 3.64)**	**<.0001**
	Adjusted*	Poor	Reference		
		Moderate	1.25	(0.97 - 1.63)	0.09
		Good	**2.28**	**(1.54 - 3.4)**	**<.0001**

*Adjusted estimates obtained after controlling for gender, marital status, ever use of tobacco, alcohol drinking, exercise habit, socio-economic condition, nutritional status and family history for chronic illnesses

Odds of having a higher level of occupational stress index

Table. 12: Estimates of quality of life and Physical environment Stressors

Physical QOL	Unadjusted	Poor	Reference		
		Moderate	**1.50[#]**	**(1.13 - 2)**	**0.01**
		Good	**1.88**	**(1.26 - 2.82)**	**0.00**
	Adjusted*	Poor	Reference		
		Moderate	**1.41**	**(1.07 - 1.86)**	**0.02**
		Good	**1.69**	**(1.16 - 2.49)**	**0.01**
Psychological QOL	Unadjusted	Poor	Reference		
		Moderate	**1.39**	**(1.05 - 1.85)**	**0.03**
		Good	**2.21**	**(1.56 - 3.15)**	**<.0001**
	Adjusted*	Poor	Reference		
		Moderate	**1.35**	**(1.03 - 1.78)**	**0.03**
		Good	**2.14**	**(1.53 - 3)**	**<.0001**
Environmental QOL	Unadjusted	Poor	Reference		
		Moderate	**2.13**	**(1.62 - 2.8)**	**<.0001**
		Good	**2.49**	**(1.63 - 3.83)**	**<.0001**
	Adjusted*	Poor	Reference		
		Moderate	**2.07**	**(1.6 - 2.7)**	**<.0001**
		Good	**2.41**	**(1.6 - 3.63)**	**<.0001**
Social QOL	Unadjusted	Poor	Reference		
		Moderate	**1.47**	**(1.1 - 1.96)**	**0.01**
		Good	**2.24**	**(1.43 - 3.51)**	**0.00**
	Adjusted*	Poor	Reference		
		Moderate	**1.44**	**(1.1 - 1.91)**	**0.01**
		Good	**2.05**	**(1.34 - 3.13)**	**0.00**

*Adjusted estimates obtained after controlling for gender, marital status, ever use of tobacco, alcohol drinking, exercise habit, socio-economic condition, nutritional status and family history for chronic illnesses

Odds of having a higher level of occupational stress index

Table. 13: Estimates of quality of life and Work Environment stressors

Physical QOL	Unadjusted	Poor	Reference		
		Moderate	**1.54#**	**(1.18 - 2.02)**	**0.00**
		Good	**1.87**	**(1.3 - 2.7)**	**0.00**
	Adjusted*	Poor	Reference		
		Moderate	**1.50**	**(1.16 - 1.95)**	**0.00**
		Good	**1.83**	**(1.29 - 2.6)**	**0.00**
Psychological QOL	Unadjusted	Poor	Reference		
		Moderate	1.15	(0.88 - 1.5)	0.33
		Good	**1.49**	**(1.09 - 2.04)**	**0.01**
	Adjusted*	Poor	Reference		
		Moderate	1.04	(0.81 - 1.35)	0.76
		Good	1.34	(1 - 1.81)	0.06
Environmental QOL	Unadjusted	Poor	Reference		
		Moderate	**1.88**	**(1.46 - 2.43)**	**<.0001**
		Good	**2.07**	**(1.42 - 3.04)**	**0.00**
	Adjusted*	Poor	Reference		
		Moderate	**1.85**	**(1.45 - 2.36)**	**<.0001**
		Good	**2.14**	**(1.49 - 3.08)**	**<.0001**
Social QOL	Unadjusted	Poor	Reference		
		Moderate	**1.38**	**(1.05 - 1.81)**	**0.02**
		Good	**2.15**	**(1.44 - 3.23)**	**0.00**
	Adjusted*	Poor	Reference		
		Moderate	1.26	(0.98 - 1.64)	0.08
		Good	**2.19**	**(1.49 - 3.24)**	**<.0001**

*Adjusted estimates obtained after controlling for gender, marital status, ever use of tobacco, alcohol drinking, exercise habit, socio-economic condition, nutritional status and family history for chronic illnesses

Odds of having a higher level of occupational stress index

Table. 14: Estimates of quality of life and Emotional Stressors

Physical QOL	Unadjusted	Poor	Reference		
		Moderate	**1.55[#]**	**(1.19 - 2.03)**	**0.00**
		Good	**1.61**	**(1.12 - 2.31)**	**0.01**
	Adjusted*	Poor	Reference		
		Moderate	**1.45**	**(1.13 - 1.88)**	**0.00**
		Good	**1.67**	**(1.18 - 2.36)**	**0.00**
Psychological QOL	Unadjusted	Poor	Reference		
		Moderate	**1.36**	**(1.04 - 1.78)**	**0.03**
		Good	**1.94**	**(1.42 - 2.66)**	**<.0001**
	Adjusted*	Poor	Reference		
		Moderate	**1.31**	**(1.02 - 1.7)**	**0.04**
		Good	**1.86**	**(1.38 - 2.51)**	**<.0001**
Environmental QOL	Unadjusted	Poor	Reference		
		Moderate	**1.76**	**(1.37 - 2.27)**	**<.0001**
		Good	**1.89**	**(1.3 - 2.75)**	**0.00**
	Adjusted*	Poor	Reference		
		Moderate	**1.78**	**(1.4 - 2.27)**	**<.0001**
		Good	**2.05**	**(1.44 - 2.95)**	**<.0001**
Social QOL	Unadjusted	Poor	Reference		
		Moderate	**1.38**	**(1.06 - 1.82)**	**0.02**
		Good	**1.98**	**(1.34 - 2.96)**	**0.00**
	Adjusted*	Poor	Reference		
		Moderate	**1.34**	**(1.03 - 1.74)**	**0.03**
		Good	**2.00**	**(1.37 - 2.93)**	**0.00**

*Adjusted estimates obtained after controlling for gender, marital status, ever use of tobacco, alcohol drinking, exercise habit, socio-economic condition, nutritional status and family history for chronic illnesses

Odds of having a higher level of occupational stress index

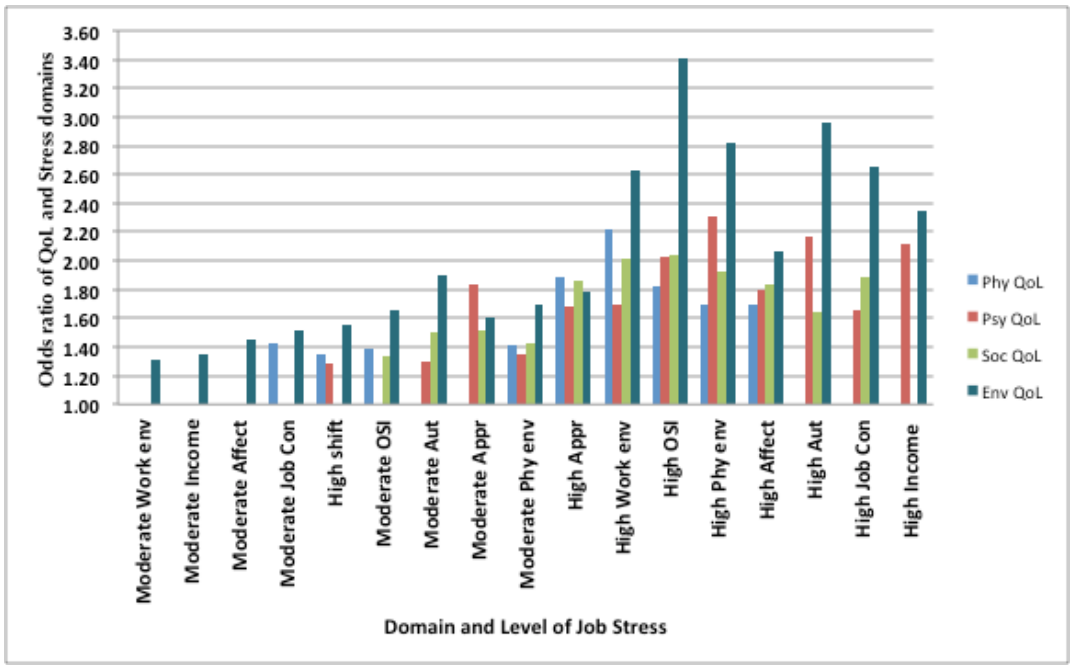

Figure.1: Summary of positive associations between Job-stress and Quality of Life in the Study.

Legend for figure.1:

Stress Domains

Moderate Work env: Moderate Work environment; Moderate Income: Income stressors; Moderate Affect; Moderate Job Con: Moderate Job control; High shift: High shift stress; Moderate OSI: Moderate Occupational Stress Index; Moderate Aut: Moderate Autonomy stressors; Moderate Appr: Moderate appreciation stressors; Moderate Phy env: Moderate Physical environment stressors; High Appr: High appreciation stressors; High Work env: High work environment stressors; High OSI: High level of Occupational Stress Index; High Phy env; High level of Physical environment stressors; High Affect; High Aut: High level of autonomy stressors; High Job Con: High level of job control stressors; High Income: High level of income stressors

Domains of Quality of Life

Blue color: Phy QoL: Physical domain of Quality of Life
Brown: Psy QoL: Psychological domain of Quality of Life
Green: Soc QoL: Social domain of Quality of Life
Violet: Env QoL: Environmental domain of Quality of Life

Appendix.1. Interview Guide For Qualitative Study - Phase 1

Introduction

1. Greet the participant.
2. Introduce yourself.
3. Emphasize the confidentiality and importance of the responses, and let people know that the names of respondents or any identifying information are not recorded. Explain that we want to know about their work environment and how it affects them, and that this information is not available anywhere else. When asking questions, prompt for more information at times by asking "anything else?"
4. Explain that their answers will remain anonymous and that the information will be combined with other answers only in statistical summaries.
5. Take "informed consent", and specifically request permission to record the interview.
6. Thank the person for having agreed to participate.

I. Socio-demographic Information

1	What is your gender?	Male	1
		Female	2
2A	What is your birth date?		
2B	How old were you on your last birthday? [in years]		
3	What is your marital status?	Married	1
		Single, never married	2
		Single, divorced	3
		Single, widowed	4
4	If you have children living at home, how many are in each of the following age groups:	Less than 4 years old	1
		4 through 12 years old	2
		13 through 18 years old	3
		19 and over	4
5	What is the highest grade of education you have completed to date?	Intermediate	1
		Undergraduate	2
		Post-graduate	3
		Other	4

II. Experience as IT/ITES professional

1. What is your current job title?

2. How long have you been working as an IT/ITES professional?

3. What do you like about your job as an IT/ITES professional?

4. What do you dislike about your job as an IT/ITES professional?

III. Quality of Work Environment

1. How do you feel about your job? (**Time Pressure at Work, Mode of Payment)**
2. Can you provide description of your work tasks at your Job?
3. What factors in the physical environment (such as air, noise, lighting, chairs, temperature) affect your health or ability to work in your workplace?
4. Do you face any conflicts in the workplace? If so, with whom (by title, not name e.g. supervisor, fellow employee)?
5. How do you spend your free time during office hours? (**Work hours and scheduling)**
6. How much control do you have on your job? (**Problems, Constraints and Influence at Work)**
7. What do you think about the job opportunities that are suitable for your experience/profile? (**Upgrading Possibilities and Evaluation of your Work)**
8. How many hours do you normally work per week in your job?
9. What factors do you think contribute to work-related discomforts or injuries?

IV. Individual's Experience with Stress

1. According to your colleagues, what factors cause stress at the work place?
2. According to you, what factors cause stress at work place?
3. According to your colleagues, what factors cause stress at the other places (other than work place)?
4. According to you, what factors cause stress at the other places (other than work place)?

V. Individual's Working and Non-working Environments

1. How do you feel about your job? (hint: **Work hours and scheduling)**
2. How do you feel about yourself?
3. What are the mental demands required by your job?
4. How do you feel about your workload and responsibility at work place?
5. What are your activities outside of work?
6. How would you rate your quality of life?
7. What do you think about the support for your work you receive from your colleagues/supervisor at your workplace?
8. What do you think of about the support for your work you receive from your family

members/ friends?'

9. What do you feel about positive attributes related to your work?

10. How do you feel about negative attributes related to your work?

11. What do you think about your future with your job?

VI. Health Information

1. During the past month, have you experienced any of the following:
   a. Diagnosed hypertension or high blood pressure?
   b. Diagnosed heart disease?
   c. Problems related to neck/shoulder/elbows/wrists/knees/ankles/back

2. If you had any of those problems, in your opinion, how did you come to have them? What did you do about it the last time you that/those symptom(s)?

3. Have you or your friends experienced any work-related pain or discomfort?

4. On an average day, how many of your friends smoke cigarettes and how many? Do you smoke?

5. On an average week, how many of your friends drink Alcohol ? Do you drink? How much they do drink per week?
6. Whether some of your friends use recreational drug use (Hint:-both injecting and non-injecting)
7.

8. How would you rate your health?

9. "In your opinion what caused the health problem?"

VII. "Risks to Health" Perceptions and Knowledge

1. Are your friends concerned about having hypertension? What makes you think so?

2. Are your friends concerned about having other health problems? What makes you think so?

3. Are you concerned about having hypertension? What makes you think you might have it?

4. Are you concerned about having other health problems? What makes you think you might have them?

5. Are your friends aware of health risks such as hypertension and where to seek treatment?

6. Are you aware of health risks such as hypertension and where to seek treatment?

7. Are you aware of problems with sex behavior of your colleagues? Do you think people at work might have multiple partners or abnormal sexual problems? Are they aware of sexually transmitted diseases?

Annexure.2: Research Questionnaire

Prevalence of risk factors and estimation of General Health Profile including Hypertension among Professionals in Information Technology sector, Bengaluru, India

SECTION.1: BACKGROUND INFORMATION

We want to know about your work environment and how it affects you including on Hypertension (High Blood Pressure). DO NOT PUT YOUR NAME ON ANY OF THE FORMS PROVIDED. Your answers are to remain anonymous.		
1	Height	_____CMS
2	Weight	_____kgs
3	Calculated BMI	
4	Waist circumference	
5	Hip circumference	
6	Leg length	
7	Blood Pressure: 1ST READING	SBP= DBP=
8	Blood Pressure: 2ND READING	SBP= DBP=
9	Were any of your parents or siblings diagnosed with Hypertension (High BP)?	Yes No
10	Do you suffer from Hypertension (High BP)?	Yes No
11	Do you suffer from Diabetes Mellitus?	Yes No

We want to know about your work environment and how it affects you including on Hypertension (High Blood Pressure). DO NOT PUT YOUR NAME ON ANY OF THE FORMS PROVIDED. Your answers are to remain anonymous		
1	Gender	1) Male 2) Female
2	How old were you on your last birthday? [in years]	_____Age
3.A	What is your current marital status	1) Married 2) Single, Never Married 3) Single, Divorced 4) Single, Widow
3.B	If you have children living at home, how many are in each of the following age groups:	1) Less than 4 years old 2) 4 through 12 years old 3) 13 through 18 years old 4) 19 and over
4.A	Caste	1) Brahmin 2) Other upper castes 3) Backward caste 4) Scheduled caste

		5) Scheduled tribe 6)Decline to provide
4.B	Highest Educational qualification	Please write _____
4.C	How much do you earn per month after taxes?	INR_____
4.D	Do you own a house?	1) Yes 2) No
4.E	Are you born in Bengaluru or a domicile resident of Bengaluru city?	1) Yes 2) No
4.F	If you answered No to 4.E, to which state you belong to?	_____State
4.G	Do you own a car?	1) Yes 2) No

SECTION.2: DETAILS ABOUT YOUR WORK PLACE

A. WORKING HOURS, DURATION AND WORK PATTERN

5	In what sector do you work?	1) I.T industry 2) ITES- Voice based 3) ITES- Non Voice based 4) Others please specify: _____
6	What is your current job title? (Please be as precise as possible)	_____
7	How long have you worked at your current job at the present site?	_____Years
8	In which capacity are you employed?	1) Full time position 2) Part time position 3) Temporary capacity 4) Other capacity, please specify: _____
9	What is the total number of years that you have worked in your current occupation?	_____Years
10	How long altogether have you been employed (in any type of work)?	_____Years
11	On an average, how many hours of work you do in one day?	_____ Hours
12	Do you ever work longer than that?	1) Yes 2) No
13	If yes in Q 11, how many extra days per month (usually)? For how many hours/day?	_____No of Days _____No of Hours
14	How many days do you work per week?	1) 3 Days 2) 4 Days 3) 5 Days 4) 6 Days 5) 7 Days

15	How long do you take to travel to your workplace from where you stay? (in hours per day) (add both onward and return journeys)	1) < 1 hours 2) 1-2 hours 3) 3-4 hours 4) > 6 hours
16	How do you travel to Office from residence?	1) company provided vehicle 2)Self driven vehicle-car 3)self driven-two wheeler 4) car pooling 5) Others, please specify _____
17	Do you feel stressful to travel to office and travel back due to traffic congestion, bad roads or poor vehicle?	1) Yes 2) No
18	According to your work-schedule, when do usually you begin work?	Start work: _____ End work: _____
19	Do you answer calls when you are at home regarding your work and/or do you work from Home even after working at work-place?	1) Never 2) Rarely 3) Occasionally 4) Frequently
20	Do you take breaks during your workday?	1) Never 2) Rarely 3) Occasionally 4) Frequently
21	If you do have some breaks, are these usually:	1) less than 15 minutes 2) At least 30 minutes
22	Do you work in shifts (shift-work)?	1) Yes 2) No
23	What is the nature of shift-work you do?	1) constant shift works (such as all nights or all dawns covering day) 2) Rotating shift work (changing schedules of shift work) that
24	If rotating in Q 23, how frequently does the schedule of night shifts for you changes?	1) Unpredictable but can change every week 2) changes every week 3)changes every fortnight (15 days) 4) changes every month
25	How many nightshifts do you usually work per month?	____ no of Nightshifts per month
26	How many free days do you usually have after working a rotating night shift?	_____ Days
27	How difficult is it for you to take time off from work?	1) Not at all 2) A little 3) Somewhat 4) Very much

28	Who is in charge of deciding your work schedule?	1) It is completely up-to me. 2)I decide on my work schedule with permission from supervisor. 3) My work schedule depends on others, or is decided by others. 4) My work schedule depends on others or is decided by others, and I have no say about it.
29	Do you perform work for your job at home?	1) Never 2) Rarely 3) Occasionally 4) Frequently
30	If 3 or 4 in Q 26, Have you included this in total number of hours while answering Qn.no, 11?	1) Yes 2) No
31	Are you allowed to work from home instead of visiting the worksite?	1) Yes, and I do so regularly 2) The option exists, but I don't often do so for the following reason(s): ____ 3) No, I must be physically present in the office during work hours.

B. EVALUATION OF WORK- EMOTIONAL ENVIRONMENT

32	My pay is:	1) Based upon how much I myself work. 2) Based upon how much my group or collective, as a whole, works. 3) Fixed.
33	My salary:	1) Covers substantially more than my basic needs and those of my family. 2) Covers a bit more than my basic needs and those of my family. 3) Just barely covers my basic needs and those of my family. 4) Totally inadequate to meet my basic needs and those of my family.
34	Are there possibilities for you to upgrade your job title/advance your career?	1) Yes 2) No

35	If yes, do you receive support and encouragement to do so?	1) Definitely yes. 2) Yes, to some extent. 3) Not really, but there is no active opposition to such efforts. 4) No, there is active opposition to such efforts.
36	Who evaluates your work?	1) No one but me evaluates my work. 2) By a supervisor with rigid or strtict standards of evaluation 3) By a supervisor with flexible or relaxed standards of evaluation
37	Is your work constantly monitored?	1) Yes 2) No
38	If yes in Q37 , please check all that apply:	1) My telephone conversations are monitored 2) My email communication is monitored 3) There is a camera monitoring me during work 4) Other type of monitoring, please describe: _____
39	Is your good work appreciated or recognized at your workplace?	1) Definitely yes 2) Yes, to some extent. 3) Not very much 4) Not at all.

C. PHYSICAL ENVIRONMENT

40	Do you have special seating arrangements suited for your needs at work-place	1) Yes 2) No
41	What is your body position and activity during work? (such as sitting, standing)	1) I am constantly in motion, with no fixed body position. 2) I mainly work in a single position, but I am free to move about 3) My body position is fixed during work, and my motion is restricted.
42	How is the ventilation in your work area?	1) Adequate 2) Inadequate
43	How is the lighting in your work area?	1) Adequate and comfortable 2) Too bright 3)Too dark 4)Others__ please specify
44	Is the keyboard placed comfortably to operate?	1) Yes 2) No

D. OTHER DETERMINANTS AT WORKPLACE

45	Do you have a deadline by which a given job or task must be completed?	1) Never 2) Rarely 3) Occasionally 4) Frequently
46	Can you control the speed at which you work?	1) Absolutely, since I work completely independently. 2) Mainly yes, since the speed at which I work doesn't affect others very much. 3) Only partially, since the speed at which I work affects the work of others in my work group. 4) No, not at all. I work on an assembly line or other paced system, and have no control over the speed at which I must work.
47	In general, do you receive clear instructions and/or information concerning your work?	1) Always 2) Usually 3) Sometimes not. 4) Frequently work instructions or needed information are unclear.
48	If you encounter some dilemma during work, and are not certain how to proceed:	1) I can always postpone a decision until the situation is clarified. 2) I can usually postpone a decision until the situation is clarified. 3) Sometimes I must act based upon the information I have at a given moment, and can't postpone the decision. 4) Usually or always I must act based upon the information I have at a given moment, and can't postpone the decision.
49	Can you get help for handling difficult situations or dilemmas?	1) Yes, I can nearly always count on such help. 2) Yes, more often than not. 3) I can't really count on getting such help. 4) Rarely or never do I get the help, which I need.
50	In general, do you have knowledge to perform your work?	1) Yes, I always possess the knowledge I need to work, 2) Yes, more often than not. 3) Sometimes No, But I can count on getting help from

		colleagues/supervisor. 4) Never and I don't get the help I need from colleagues/supervisor.
51	Are your work tasks monotonous and lacks new or creative tasks frequently?	1) Not at all. 2) Mainly no, a given task usually has its particular qualities, so it's not exactly the same. 3) Some of my tasks are monotonous, the same thing over and over again. 4) Most of my tasks are monotonous, the same thing over and over again.
52	Is there a defined way of solving problems in your work?	1) Not at all. I must think up the strategy myself in order to solve problems, and that always requires imagination and creativity. 2) Basically not. I must often come up with a strategy on my own. 3) Pretty much so. There are a few variations, but the basic strategy has already been defined. 4) Very much so. There is a strictly defined strategy, which I must follow to solve problems for my work.
53	If yes, does such system work efficiently at your workplace?	1) Yes 2) No
54	Are there abuses of power or violations of norms of behavior at work?	1) Never 2) Rarely 3) Occasionally 4) Frequently
55	Are you blamed for someone else's mistakes at workplace?	1) Never 2) Rarely 3) Occasionally 4) Frequently
56	Has the credit for your work is taken by your supervisor?	1) Never 2) Yes, Only once 3) Yes, twice 4) Yes, more than twice
57	How do you feel about transparency at your work-place?	1) Very transparent 2) Transparent, but unclear about some issues 3) Doubtful transparency 4) Not transparent at all
58	Are you compared to other colleagues for the work done at work-place?	1) Never 2) Rarely

		3) Occasionally 4) Frequently
59	Have you been involved in escalations from problems at your end?	1) Never 2) Rarely 3) Occasionally 4) Frequently
60	Do you get to bear abusive communication at work place either from customer or supervisor?	1) Never 2) Rarely 3) Occasionally 4) Frequently
61	Do you feel that you are discriminated against because of any factor?	1) Yes 2) No
62	If Yes, what do you think is the factor for such discrimination?	1) Gender 2)Race 3)Caste 4)Region from which I belong to 5) Others___ (please specify)

E. LIFESTYLE DETERMINANTS

63	Have you ever used Tobacco in any form such as chewing tobacco, cigarettes, and bidis (hand-rolled cigarettes).	Yes	No
64	During the last 30 days, did you (chew tobacco in any form?) (smoke one or more bidis?) (smoke one or more cigarettes?)".	Yes	No

If you have answered yes to 63 or 64, please answer 65-67, or else go to 68.

On an average day, how many of each of the following do you do?		
65	Cigarettes	_____No's
66	Cigars	_____No's
67	Pipefuls of Tobacco	_____No's

68	Do you drink Alcohol?	1) Never 2) Rarely 3) Occasionally 4) Frequently

69	If yes, what is the frequency?	1)Daily 2)Weekly once 3)Weekly twice 4)Monthly 5)Occasionally
70	Do you take any injectible drugs?	1) Never 2) Rarely 3) Occasionally 4) Frequently
71	Do you take any non-injectible drugs?	1) Never 2) Rarely 3) Occasionally 4) Frequently
72	Do you do physical exercises for at least 20 minutes on every day?	1) Yes 2) No

72A	Do you perform regular exercise program, or accumulate 20 minutes+ of moderate physical activity at least 5 days per week?	1) Yes 2) No
72B	Do you exercise at a moderate intensity (e.g., brisk walking) or vigorous intensity (e.g., jogging)?	1)Moderate 2)Vigorous
72C	Do you currently engage in regular aerobic/cardio activities such as fitness walking, jogging, swimming, cardio equipment, aerobics classes or videos, etc? If yes:	1) Yes 2) No
72D	What are the current goals of exercises you perform (Indicate all that apply)?	1) Establish Exercise habit 2) Sports conditioning: 3) Improve cardiovascular fitness 4) Injury Rehabilitation 5) Improve muscle tone 6) Increase strength and endurance 7) Increase muscle mass 8) Improve flexibility 9) Train for a triathlon 10) Train for bicycle event 11) Train for running event, i.e. 5k, 10k, marathon

73	Has your weight changed in the last 1 year?	1) Yes 2) No
74	If yes, how has the change in weight been?	1) Gained by _____ kgs 2) Lost _____ kgs

75. Please list any food or drink with calories you have had consumed in the past 24 hours:

	Meal or Snack	Time	Place	What and how much?
A	Breakfast or 1st meal			
B	Snack			
C	Lunch or 2nd meal			
D	Snack			
E	Evening or 3 meal			
F	Snack			
G	Other			

SECTION.3: DETAILS ABOUT YOUR HEALTH

F.MUSCULOSKELETAL SYMPTOMS and GENERAL HEALTH PROFILE

76	Have you ever experienced work-related pain or discomfort in any part of you body that lasted for more than 3 days in the last 12 months?	1) Yes 2) No

Consider all the work- related problems you have experienced and indicate the location?
77. Please note that this part of the questionnaire should be answered, even if you have never had trouble in any parts of the body.

Sl No	Part of the body	Have you at any time during the last 12 months had trouble (such as ache, pain, discomfort, numbness) in		During the past 12 months, have you been prevented from carrying out normal activities (housework, hobbies, work) because of this trouble		During the past 12 months, have you seen a physician for this condition		Have you at any time during the last 7 days had trouble (such as ache, pain, discomfort, numbness) in	
1	Head	Yes	No	Yes	No	Yes	No	Yes	No
2	Eye	Yes	No	Yes	No	Yes	No	Yes	No
3	Neck	Yes	No	Yes	No	Yes	No	Yes	No
4	Shoulders	Yes	No	Yes	No	Yes	No	Yes	No
5	Elbows	Yes	No	Yes	No	Yes	No	Yes	No
6	Wrists/hands	Yes	No	Yes	No	Yes	No	Yes	No
7	Upper back	Yes	No	Yes	No	Yes	No	Yes	No
8	Lower back (small of the back)	Yes	No	Yes	No	Yes	No	Yes	No
9	One or both hips/buttocs/thighs	Yes	No	Yes	No	Yes	No	Yes	No
10	One of both knees	Yes	No	Yes	No	Yes	No	Yes	No
11	One of both ankles/feet	Yes	No	Yes	No	Yes	No	Yes	No

78. In order to reduce the strain on my body when working

Sl No	Strategies	Almost Always	Some times	Almost Never
1	I get someone else to help me handle a heavy object	1	2	3
2	I modify my position, posture	1	2	3
3	I use a different part of my body to do a skilled job (like using left hand instead of right hand)	1	2	3
4	I warm up and stretch before performing strenuous work.	1	2	3
6	I pause regularly so I can stretch and change posture.	1	2	3
7	I adjust height of chair before starting to work or during working hours	1	2	3
8	I select techniques that will not aggravate or provoke my discomfort.	1	2	3
9	I stop a work if it causes or aggravate my discomfort	1	2	3

79. Please read each question, assess your feelings, and circle the number on the scale that gives the best answer for you for each question. (Please circle the number)

1) How would you rate your quality of life?	Very poor	Poor	Neither poor nor good	Good	Very Good
	1	2	3	4	5

2) How satisfied are you with your health?	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
	1	2	3	4	5

80. The following questions ask about how much you have experienced certain things in the last two weeks. (Please circle the number)

	Not at all	A little	Moderately	Very much	Extremely
3) To what extent do you feel that physical pain prevents you from doing what you need to do?	1	2	3	4	5
4) How much do you need any medical treatment to function in your daily life?	1	2	3	4	5
5) How much do you enjoy life?	1	2	3	4	5
6) To what extent do you feel your life to be meaningful?	1	2	3	4	5

(Please circle the number)

	Not at all	Slightly	Moderately	Very much	Extremely
7) How well are you able to concentrate?	1	2	3	4	5
8) How safe do you feel in your daily life?	1	2	3	4	5
9) How healthy is your physical environment?	1	2	3	4	5

81. The following questions ask about how completely you experience or were able to do certain things in the last two weeks. (Please circle the number)

	Not at all	A little	Moderately	Mostly	Completely
10) Do you have enough energy for everyday life?	1	2	3	4	5
11) Are you able to accept your bodily appearance?	1	2	3	4	5
12) Have you enough money to meet your needs?	1	2	3	4	5
13) How available to you is the information that you need in your day-to-day life?	1	2	3	4	5
14) To what extent do you have the opportunity	1	2	3	4	5

for leisure activities?					

(Please circle the number)

	Very poor	Poor	Neither poor nor well	Well	Very well
15) Do you have enough energy for everyday life?	1	2	3	4	5

82. The following questions ask you to say how good or satisfied you have felt about various aspects of your life over the last two weeks. (Please circle the number)

	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
16) How satisfied are you with your sleep?	1	2	3	4	5
17) How satisfied are you with your ability to perform your daily living activities?	1	2	3	4	5
18) How satisfied are you with your capacity for work?	1	2	3	4	5
19) How satisfied are you with your abilities?	1	2	3	4	5
20) How satisfied are you with your personal relationships?	1	2	3	4	5
21) How satisfied are you with your sex life?	1	2	3	4	5
22) How satisfied are you with the support you get from your friends?	1	2	3	4	5
23) How satisfied are you with the conditions of your living place?	1	2	3	4	5
24) How satisfied are you with your access to health services?	1	2	3	4	5
25) How satisfied are you with your mode of transportation?	1	2	3	4	5
26) How satisfied are you with your energy levels on Friday evening?					
27) How satisfied are you with your energy	1	2	3	4	5

levels on Friday evening?					
28) How satisfied are you with your energy levels on Monday morning?	1	2	3	4	5

83. The following question refers to how often you have felt or experienced certain things in the last two weeks. (Please circle the number)

	Never	Seldom	Quite often	Very often	Always
29) How often do you have negative feelings, such as blue mood, despair, anxiety, depression?	1	2	3	4	5

References:

1. Bergner, M., et al., *The Sickness Impact Profile: development and final revision of a health status measure.* Medical care, 1981: p. 787-805.
2. Hunt, S.M., et al., *The Nottingham Health Profile: subjective health status and medical consultations.* Social Science & Medicine. Part A: Medical Sociology, 1981. **15**(3): p. 221-229.
3. Ware, J., et al., *SF-36 health survey manual and interpretation guide. New England Medical Center.* The Health Institute, Boston, MA, 1993.
4. Anand, S. and K. Hanson, *Disability-adjusted life years: a critical review.* Journal of health economics, 1997. **16**(6): p. 685-702.
5. La Puma, J. and E.F. Lawlor, *Quality-adjusted life-years.* JAMA: the journal of the American Medical Association, 1990. **263**(21): p. 2917-2921.
6. Wolfson, M.C., *Health-adjusted life expectancy.* Health Reports-Statistics Canada, 1996. **8**: p. 41-45.
7. Group, W., *Development of the WHOQOL: Rationale and current status.* International Journal of Mental Health, 1994. **23**(3): p. 24-56.
8. Stengler-Wenzke, K., et al., *Quality of life in obsessive-compulsive disorder: the different impact of obsessions and compulsions.* Psychopathology, 2007. **40**(5): p. 282-289.
9. Group, W., *The development of the World Health Organization quality of life assessment instrument (the WHOQOL).* Quality of life assessment: international perspectives. Heidelberg: Springer Verlag, 1994: p. 41-60.
10. Skevington, S.M., M. Lotfy, and K.A. O'Connell, *The World Health Organization's WHOQOL-BREF quality of life assessment: psychometric properties and results of the international field trial. A report from the WHOQOL group.* Quality of Life Research, 2004. **13**(2): p. 299-310.
11. Saxena, S., et al., *The WHO quality of life assessment instrument (WHOQOL-Bref): the importance of its items for cross-cultural research.* Quality of Life Research, 2001. **10**(8): p. 711-721.
12. Chandra, P.S., et al., *Relationship of psychological morbidity and quality of life to illness-related disclosure among HIV-infected persons.* Journal of Psychosomatic Research, 2003. **54**(3): p. 199-203.
13. Noerholm, V., et al., *Quality of life in the Danish general population–normative data and validity of WHOQOL-Bref using Rasch and item response theory models.* Quality of Life Research, 2004. **13**(2): p. 531-540.
14. Herrman, H., G. Hawthorne, and R. Thomas, *Quality of life assessment in people living with psychosis.* Social psychiatry and psychiatric epidemiology, 2002. **37**(11): p. 510-518.
15. O'Carroll, R., et al., *A comparison of the WHOQOL-100 and the WHOQOL-BREF in detecting change in quality of life following liver transplantation.* Quality of Life Research, 2000. **9**(1): p. 121-124.
16. Van Heck, G.L. and J.D. Vries, *Quality of life of patients with chronic fatigue syndrome.* Journal of Chronic Fatigue Syndrome, 2002. **10**(1): p. 17-35.
17. Chachamovich, E., C. Trentini, and M.P. Fleck, *Assessment of the psychometric performance of the WHOQOL-BREF instrument in a sample of Brazilian older adults.* International Psychogeriatrics, 2007. **19**(04): p. 635-646.

18. Amir, M. and R. Lev-Wiesel, *Time does not heal all wounds: Quality of life and psychological distress of people who survived the Holocaust as children 55 years later.* Journal of Traumatic Stress, 2003. **16**(3): p. 295-299.
19. Skevington, S.M. and F.M. McCrate, *Expecting a good quality of life in health: assessing people with diverse diseases and conditions using the WHOQOL-BREF.* Health Expectations, 2012. **15**(1): p. 49-62.
20. Jha, A., et al., *Exploring the quality of life (QOL) in the Indian software industry: a public health viewpoint.* International journal of public health, 2011: p. 1-11.
21. Kesavachandran, C., et al., *Working conditions and health among employees at information technology-enabled services: A review of current evidence.* Indian Journal of Medical Sciences, 2006. **60**(7): p. 300.
22. Sigman, A., Personnel Management, 1992. **24**: p. 24.
23. Be, B., *Musculoskeletal disorders and workplace factors: a critical review of epidemiologic evidence for work-related musculoskeletal disorders of neck, upper extremity, and low back.* 1997.
24. Foster, J.H., et al., *Quality of life measures in alcohol dependent subjects and changes with abstinence and continued heavy drinking.* Addiction Biology, 1998. **3**(3): p. 321-332.
25. Giridhara R Babu, R.D., *Chapter.2. Methods of IT/ITES study in Bengaluru, India*, in *Department of Epidemiology, The UCLA Jonathan and Karin Fielding School of Public Health.*2012, University of California Los Angeles: Los Angeles. p. 41.
26. Fischer, J.E., et al., *Experience and endocrine stress responses in neonatal and pediatric critical care nurses and physicians.* Critical care medicine, 2000. **28**(9): p. 3281.
27. India, G.o., *National classification of occupations: occupational titles with definitions*2004: Directorate General of Employment & Training (DGET), Ministry of Labour & Employment.
28. Babu, G.R., *Chapter.2. Methods of IT/ITES study in Bengaluru, India*, in *Epidemiology*2012, University of California Los Angeles: Los Angeles. p. 41.
29. Giridhara R Babu, R.D., *Chapter.2. Methods of IT/ITES study in Bengaluru, India*, in *Epidemiology*2012, University of California Los Angeles: Los Angeles. p. 41.
30. (WHO), W.H.O., *WHOQOL: measuring quality of life*, 1997, Division of Mental Health and Prevention of Substance Abuse, World Health Organization.
31. Murphy, L.R., *Job stress research at NIOSH: 1972–2002.* 2002.
32. Belkic, K., *The occupational stress index: an approach derived from cognitive ergonomics and brain research for clinical practice*2003: Cambridge International Science Pub.
33. Emdad, R., et al., *Work environment, neurophysiologic and psychophysiologic models among professional drivers with and without cardiovascular disease: Seeking an integrative neurocardiologic approach.* Stress Medicine, 1997. **13**(1): p. 7-21.
34. Belkic, K. and C. Savic, *The occupational stress index--An approach derived from cognitive ergonomics applicable to clinical practice.* Scandinavian Journal of Work, Environment & Health, 2008. **34**(6): p. 169.

35. Belkić, K., et al., *Event-related potentials in professional city drivers: Heightened sensitivity to cognitively relevant visual signals.* Physiology & behavior, 1992. **52**(3): p. 423-427.
36. Belkic, K., *Occupational Stress Index: An introduction.* Scan. J. Work Environ. Health, 2000: p. 73-86.
37. Hannerz, H., et al., *Occupational factors and 5-year weight change among men in a danish national cohort.* Health Psychology, 2004. **23**(3): p. 283.
38. Nedić, O., et al., *Work stressors among physicians with and without the acquired cardiovascular disorders: Assessment using the Occupational Stress Index.* Medicinski pregled, 2008. **61**(5-6): p. 226-234.
39. Schnall, P., K. Belkic, and T. Pickering, *Assessment of the cardiovascular system at the workplace.* Occup Med, 2000. **15**(1): p. 189-212.
40. Nedić, O., et al., *Job stressors among female physicians: relation to having a clinical diagnosis of hypertension.* International journal of occupational and environmental health, 2010. **16**(3): p. 330-340.
41. Ugljesic, M., et al., *Exercise testing of young, apparently healthy professional drivers.* Scandinavian Journal of Work Environment and Health, 1996. **22**: p. 211-215.
42. Belki, K., *Occupation-specific versus general self-report measures to assess psychosocial workplace exposures-dilemmas and potential solutions to bridge the gap.* ARBETE OCH HALSA VETENSKAPLIG SKRIFTSERIE, 2001(10): p. 258-260.
43. Karasek Jr, R.A., *Job demands, job decision latitude, and mental strain: Implications for job redesign.* Administrative science quarterly, 1979: p. 285-308.
44. Landsbergis, P., et al., *Measurement of psychosocial workplace exposure variables.* Occupational medicine (Philadelphia, Pa.), 2000. **15**(1): p. 163.
45. Giridhara R Babu, R.D., *Chapter.3. A Qualitative study about work-environment of software professional in Bengaluru, India*, in *Department of Epidemiology, The UCLA Jonathan and Karin Fielding School of Public Health.*2012, University of California Los Angeles: Los Angeles. p. 47.
46. Crawford, J.O., *The Nordic musculoskeletal questionnaire.* Occupational medicine, 2007. **57**(4): p. 300-301.
47. Kuorinka, I., et al., *Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms.* Applied Ergonomics, 1987. **18**(3): p. 233-237.
48. Dickinson, C., et al., *Questionnaire development: an examination of the Nordic Musculoskeletal Questionnaire.* Applied Ergonomics, 1992. **23**(3): p. 197-201.
49. Hoy, D.G., et al., *A systematic review of the global prevalence of low back pain.* Arthritis & Rheumatism, 2012.
50. Das, B. and T. Ghosh, *Assessment of Ergonomical and Occupational Health Related Problems Among VDT Workers of West Bengal, India.* Asian Journal of Medical Sciences, 2011. **1**(2): p. 26-31.
51. Das, B. and S. Gangopadhyay, *Prevalence of Musculoskeletal Disorders and Physiological Stress Among Adult, Male Potato Cultivators of West Bengal, India.* Asia-Pacific Journal of Public Health, 2012.
52. Raj, P., A. Narayan, and S. Ganesan, *Comparision of Musculoskeletal Symptoms Among Adult Female Caregivers of Physically Challenged Children*

and Normal Children. Indian Journal of Physiotherapy and Occupational Therapy-An International Journal, 2011. **5**(4): p. 146-149.
53. Borle, A., et al., *Musculoskeletal morbidities among bus drivers in city of Central India.* Age (Years), 2012. **46**(06.69): p. 28-57.
54. Gangopadhyay, S., et al., *Prevalence of Musculoskeletal Disorders among pre-adolescent agricultural workers of West Bengal, India.* Ergonomics SA, 2006. **18**(1): p. 14-21.
55. Gangopadhyay, S., et al., *Prevalence of upper limb musculo skeletal disorders among brass metal workers in West Bengal, India.* Industrial Health, 2007. **45**(2): p. 365-370.
56. Palmer, K., et al., *Repeatability and validity of an upper limb and neck discomfort questionnaire: the utility of the standardized Nordic questionnaire.* Occupational medicine, 1999. **49**(3): p. 171-175.
57. Institute, S., *SAS software: version 9.1*, 2002, SAS Institute Cary, NC.
58. McCullagh, P., *Regression models for ordinal data.* Journal of the royal statistical society. Series B (Methodological), 1980: p. 109-142.
59. Altman, D.G., *Statistics in medical journals: developments in the 1980s.* Statistics in medicine, 1991. **10**(12): p. 1897-1913.
60. Griffiths, K.L., M.G. Mackey, and B.J. Adamson, *The impact of a computerized work environment on professional occupational groups and behavioural and physiological risk factors for musculoskeletal symptoms: a literature review.* Journal of Occupational Rehabilitation, 2007. **17**(4): p. 743-765.
61. Saiyed, H.N. and R.R. Tiwari, *Occupational health research in India.* Industrial Health, 2004. **42**(2): p. 141-148.
62. Sharma, L., *Call centers-The sun shine sector.* Employment News, 2005: p. 1.
63. Morrison, W.E., et al., *Noise, stress, and annoyance in a pediatric intensive care unit.* Critical care medicine, 2003. **31**(1): p. 113.
64. Choudhary, S., S. Sapur, and P. Deb, *Awkward posture and development of RSI (Repetitive strain injury) in computer professionals.* Indian J Occup Environ Med, 2002. **6**: p. 10-2.
65. Commissaris, D., et al. *Recommendations for sufficient physical activity at work*. 2007.
66. Work, E.A.f.S.a.H.a., *Health and safety at work in Europe (1999–2007): A statistical portrait*, 2010, European Union: Luxembourg. p. 97.
67. Bhattacharya, S. and J. Basu, *Distress, wellness and organizational role stress among IT professionals: Role of life events and coping resources.* Journal of the Indian Academy of Applied Psychology, 2007. **33**(2): p. 169-178.
68. Chaturvedi, S., et al., *Detection of stress, anxiety and depression in IT/ITES professionals in the Silicon Valley of India: a preliminary study.* Primary Care and Community Psychiatry, 2007. **12**(2): p. 75-80.
69. Albrecht, G.L. and P.J. Devlieger, *The disability paradox: high quality of life against all odds.* Social science & medicine, 1999. **48**(8): p. 977-988.
70. Parekh KJ, S.A., Sarkar P, Sharma RP. *Symptoms in computer users and ergonomics solutions.* . in *Proceedings of 56th National conference on occupational health, safety and environment. IAOH*. 2006. Jamshedpur, India.

71. Seppala, P., *Experience of stress, musculoskeletal discomfort, and eyestrain in computer-based office work: a study in municipal workplaces.* International Journal of Human-Computer Interaction, 2001. **13**(3): p. 279-304.
72. Bergqvist, U., et al., *Musculoskeletal disorders among visual display terminal workers: individual, ergonomic, and work organizational factors.* Ergonomics, 1995. **38**(4): p. 763-776.
73. Davies, S., *Unique demands of Visual Display Unit (VDU) operation in finance-auditing type tasks: a case study.* Ergonomics SA, 2001. **13**: p. 40-45.
74. Ferreira, M. and P.H.N. Saldiva, *Computer-telephone interactive tasks: predictors of musculoskeletal disorders according to work analysis and workers' perception.* Applied Ergonomics, 2002. **33**(2): p. 147-153.
75. Halford, V. and H.H. Cohen, *Technology use and psychosocial factors in the self-reporting of musculoskeletal disorder symptoms in call center workers.* Journal of Safety Research, 2003. **34**(2): p. 167-173.
76. Rocha, L.E., et al., *Risk factors for musculoskeletal symptoms among call center operators of a bank in Sao Paulo, Brazil.* Industrial Health, 2005. **43**(4): p. 637-646.
77. Sudhashree, V., K. Rohith, and K. Shrinivas, *Issues and concerns of health among call center employees.* Indian Journal of Occupational and Environmental Medicine, 2005. **9**(3): p. 129.
78. Bakhtiar, C.S. and R. Vijaya, *Attitude alters the risk for development of RSI in software professionals.* Indian Journal of Occupational and Environmental Medicine, 2003. **7**(1): p. 7.
79. Woods, V., *Musculoskeletal disorders and visual strain in intensive data processing workers.* Occupational medicine, 2005. **55**(2): p. 121-127.
80. Sillanpää, J., et al., *Effect of work with visual display units on musculo,Äêskeletal disorders in the office environment.* Occupational medicine, 2003. **53**(7): p. 443-451.
81. Yu, I.T. and T.W. Wong, *Musculoskeletal problems among VDU workers in a Hong Kong bank.* Occup Med (Lond), 1996. **46**(4): p. 275-80.
82. Teigen, K.H., *Yerkes-Dodson: A law for all seasons.* Theory & Psychology, 1994. **4**(4): p. 525-547.
83. Broadhurst, P., *The interaction of task difficulty and motivation: The Yerkes-Dodson law revived.* Acta Psychologica, 1959. **16**(26): p. 321-338.
84. Winton, W.M., *Do introductory textbooks present the Yerkes-Dodson Law correctly?* American Psychologist; American Psychologist, 1987. **42**(2): p. 202.
85. Broadbent, D.E., *A REFORMULATION OF THE YERKES□DODSON LAW.* British Journal of Mathematical and Statistical Psychology, 1965. **18**(2): p. 145-157.
86. Selye, H., *On the real benefits of eustress.* Psychology Today, 1978. **11**: p. 60-70.
87. Selye, H., *The nature of stress.* Basal Facts, 1985. **7**(1): p. 3-11.
88. Selye, H., *Forty years of stress research: principal remaining problems and misconceptions.* Canadian Medical Association Journal, 1976. **115**(1): p. 53.
89. Selye, H., *Stress and distress.* Comprehensive therapy, 1975. **1**(8): p. 9.

90. Fevre, M.L., J. Matheny, and G.S. Kolt, *"Eustress, distress, and interpretation in occupational stress", .* Journal of Managerial Psychology, 2003. **18**(7): p. 726 - 744.
91. Selye, H., *Confusion and controversy in the stress field.* Journal of Human Stress, 1975. **1**(2): p. 37-44.
92. Selye, H., *Selye's guide to stress research*. Vol. 2. 1983: Van Nostrand Reinhold Company.
93. Antonovsky, A., *Health, stress, and coping*1979: Jossey-Bass San Francisco.
94. Delgado, C., *Sense of coherence, spirituality, stress and quality of life in chronic illness.* Journal of Nursing Scholarship, 2007. **39**(3): p. 229-234.
95. Landis, B., *Uncertainty, spiritual well-being, and psychosocial adjustment to chronic illness.* Issues in Mental Health Nursing, 1996. **17**(3): p. 217-231.
96. Parmenter, T., *An analysis of the dimensions of quality of life for people with physical disabilities.* Quality of life for handicapped people, 1988: p. 7-36.
97. Baker, F. and J. Intagliata, *Quality of life in the evaluation of community support systems.* Evaluation and program planning, 1982. **5**(1): p. 69-79.
98. Felce, D. and J. Perry, *Quality of life: Its definition and measurement.* Research in developmental disabilities, 1995. **16**(1): p. 51-74.
99. Karakaya, M.G., et al., *Functional Mobility, Depressive Symptoms, Level of Independence, and Quality of Life of the Elderly Living at Home and in the Nursing Home.* Journal of the American Medical Directors Association, 2009. **10**(9): p. 662-666.
100. Esposito, A., et al., *Health status of women at work: work risks and living conditions.* G Ital Med Lav Ergon, 2007. **29**(3 Suppl): p. -391.
101. Sweet, S. *Job Insecurity , a Sloan Work and Family Encyclopedia Entry.* . 2006; Available from: http://wfnetwork.bc.edu/encyclopedia_entry.php?id=4136&area=academics.
102. Chouinard, V., *Women with disabilities' experiences of government employment assistance in Canada.* Disability & Rehabilitation, 2010. **32**(2): p. 148-158.
103. Miller, A. and S. Dishon, *Health-related quality of life in multiple sclerosis: The impact of disability, gender and employment status.* Quality of Life Research, 2006. **15**(2): p. 259-271.
104. Karazman, R., et al., *Effects of ergonomic and health training on work interest, work ability and health in elderly public urban transport drivers.* International Journal of Industrial Ergonomics, 2000. **25**(5): p. 503-511.
105. Hogg, M., et al., *Work disability in adults with cystic fibrosis and its relationship to quality of life.* Journal of Cystic Fibrosis, 2007. **6**(3): p. 223-227.
106. Vuletic, G. *Health related quality of life and satisfaction with life in Croatia*. 2006.
107. D'Mello, M. and S. Sahay, *"I am kind of a nomad where I have to go places and places"… Understanding mobility, place and identity in global software work from India.* Information and Organization, 2007. **17**(3): p. 162-192.
108. Cheng, Y., et al., *Job insecurity and its association with health among employees in the Taiwanese general population.* Social science & medicine, 2005. **61**(1): p. 41-52.

109. Agarwal, R. and J. Prasad, *A field study of the adoption of software process innovations by information systems professionals.* Engineering Management, IEEE Transactions on, 2000. **47**(3): p. 295-308.
110. Brand, R., et al., *Effects of a physical exercise intervention on employees‚Äô perceptions of quality of life: a randomized controlled trial.* Sozial-und Pr√§ventivmedizin/Social and Preventive Medicine, 2006. **51**(1): p. 14-23.
111. Laforge, R.G., et al., *Stage of Regular Exercise and Health-Related Quality of Life* 1,* 2,* 3,* 4.* Preventive medicine, 1999. **28**(4): p. 349-360.
112. Sunetra Bhattacharya, J.B., *Distress, Wellness and Organizational Role Stress among IT Professionals: Role of Life Events and Coping Resources.* Journal of the Indian Academy of Applied Psychology., 2007. **33**(2): p. 169-178.
113. Carlson, D.S. and P.L. Perrewé, *The role of social support in the stressor-strain relationship: An examination of work-family conflict.* Journal of Management, 1999. **25**(4): p. 513-540.
114. Bedeian, A.G., B.G. Burke, and R.G. Moffett, *Outcomes of work-family conflict among married male and female professionals.* Journal of Management, 1988. **14**(3): p. 475-491.
115. Allen, T.D., et al., *Consequences associated with work-to-family conflict: A review and agenda for future research.* Journal of occupational health psychology, 2000. **5**(2): p. 278.
116. Netemeyer, R.G., T. Brashear-Alejandro, and J.S. Boles, *A cross-national model of job-related outcomes of work role and family role variables: A retail sales context.* Journal of the Academy of Marketing Science, 2004. **32**(1): p. 49-60.