

**HEALTH PROFILE OF ADULT BEEDI WORKERS AMONG
UNORGANIZED SECTORS IN KOLAR CITY**

By

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Under the Guidance of
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LIST OF ABBREVIATIONS

SC-Scheduled Caste

ST-Scheduled Tribe

OBC- Other Backward Classes

BPL-Below Poverty Line

APL-Above Poverty Line

SES-Socio Economic Status

WHO-World Health Organization

ATS- American Thoracic Society

BWWF- Beedi Workers Welfare Fund

df - Degree of freedom

FEF₂₅₋₇₅- Forced Expiratory Flow over the middle one half of the FVC

FEV₁ - Forced Expiratory Volume in the first second

FVC - Forced Vital Capacity

GOLD - Global Initiative for Chronic Obstructive Lung Disease

IHD - Ischemic Heart Disease

ILO - International Labour Organization

PEFR- Peak Expiratory Flow Rate

PFT - Pulmonary Function Tests

SD - Standard Deviation

SNQ- Standardized Nordic questionnaire

Abstract

INTRODUCTION

Over 35 million people are involved in tobacco industry which includes farmers, farm workers, beedi workers, tendu leaf pluckers and traders. The actual number of beedi workers are much higher as there are many unorganized sectors enrolled in beedi manufacturing in India.

Beedi rolling causes serious occupational health hazards to the workers and their family who are constantly exposed to tobacco dust and hazardous chemicals, compounded by factors at the place of work.

Two types of occupational diseases have been identified among the beedi workers. They are - injurious effects due to inhalation of tobacco dust and the other is the result of long hours of continuous sitting in an improper working posture. The occupational health hazards of beedi workers remain neglected for a long time and there is a need to study health problems among beedi workers and reduce it.

OBJECTIVES

1. To study the health problems among adult beedi workers.
2. To study the socio-economic status and living conditions of adult beedi workers.

METHODS:

A cross sectional study was done among adult beedi workers residing in Kolar city, with the objective of assessing the health problems among them. The study included 384 beedi workers. A pretested, semi-structured questionnaire was used to collect data regarding socio-demographic profile, personal habits, housing conditions, work pattern and morbidity pattern. Spirometry was performed on 20% of study subjects. Statistical analysis was performed using SPSS version 22.

RESULTS:

The study comprised of 384 study subjects out of which, 371(96.6%) were females and 13(3.4%) were males. 214 (55.7%) belonged to class IV socio-economic status according to modified B G Prasad

Classification. 151 (39%) were working for more than 20 years and only 79 (20.6%) of them were working for less than 5 years. Among them only 166 (43.2%) were registered under Beedi Welfare Association and 114 (29.70%) were aware of welfare schemes. Among the health problems, most common were musculoskeletal problems involving 277 (72.02%) subjects, followed by respiratory problems among 159 (41.40%), eye problems among 46 (11.9%) and others 23 (5.9%). Most common chronic illness were found to be Hypertension in 43(43.88%) followed by Asthma 26 (26.53 %), Diabetes Mellitus 12(12.24%), Ischemic Heart Disease 7 (7.4%) and others 10(10.20%).

Lung functions were assessed by spirometry in 83 study subjects of whom 8 (9.6%) were having obstructive features, followed by 2 (2.4%) with restrictive features, 3 (3.6%) having mixed and 70 (84.3%) showing normal spirometry findings.

INTERPRETATION & CONCLUSION:

Musculoskeletal problem was the most common morbidity among beedi workers involved in the beedi rolling activity, which was related to the number of years of service and the working posture of continuous forward bending of the trunk. There was also a lack of awareness about

welfare schemes as a result of which both registration and utilization of welfare schemes were less among these workers. Educational status of such workers was found to play an important role in creating awareness and in turn utilization of welfare schemes.

Key words: Occupational diseases, Morbidity, Beedi workers, Spirometry, Nordic questionnaire.

TABLE OF CONTENTS

Sl No	CONTENTS	Page No.
1	INTRODUCTION	1-5
2	NEED FOR THE STUDY	6
3	OBJECTIVES	7
4	REVIEW OF LITERATURE	8-25
5	MATERIAL AND METHODS	26-37
6	RESULTS	38-78
7	DISCUSSION	80-86
8	SUMMARY AND CONCLUSION	87-89
9	RECOMMENDATION	90
10	LIMITATIONS	91
11	BIBLIOGRAPHY	92-101
12	ANNEXURE	102-121

LIST OF TABLES

Table No	Title of The Table	Page No
1	AGE DISTRIBUTION OF THE BEEDI WORKERS.	38
2	SEX DISTRIBUTION AMONG THE STUDY SUBJECT.	40
3	DISTRIBUTION OF BEEDI WORKERS ACCORDING TO RELIGION.	41
4	EDUCATION STATUS OF BEEDI WORKERS.	42
5	DISTRIBUTION OF BEEDI WORKERS ACCORDING TO MARITAL STATUS.	43
6	DISTRIBUTION OF BEEDI WORKERS ACCORDING TO SOCIO ECONOMIC STATUS.	44
7	DISTRIBUTION OF BEEDI WORKERS AS PER TYPE OF FAMILY.	45
8	DISTRIBUTION OF BEEDI WORKERS ACCORDING TO DURATION OF BEEDI ROLLING.	46
9	DISTRIBUTION OF BEEDI WORKERS ACCORDING TO NUMBER OF WORKING DAYS PER WEEK.	48
10	DISTRIBUTION OF BEEDI WORKERS ACCORDING TO WORKING HOURS PER DAY.	49
11	DISTRIBUTION OF BEEDI WORKERS ACCORDING TO NUMBER OF BEEDI'S ROLLED PER DAY.	50

12	DISTRIBUTION OF BEEDI WORKERS ACCORDING TO PLACE OF WORK.	51
13	DISTRIBUTION OF BEEDI WORKERS ACCORDING TO TYPE OF HOUSE.	52
14	DISTRIBUTION OF BEEDI WORKERS ACCORDING TO INDOOR FACTORS.	53
15	ASSOCIATION BETWEEN AGE GROUP AND TOBACCO CONSUMPTION AMONG BEEDI WORKERS	55
16	DISTRIBUTION OF BEEDI WORKERS ACCORDING TO REGISTRATION FOR WELFARE SCHEMES.	56
17	DISTRIBUTION OF BEEDI WORKERS ACCORDING TO AWARENESS FOR WELFARE SCHEMES.	57
18	RELATIONSHIP BETWEEN REGISTRATION OF WELFARE SCHEMES AND EDUCATIONAL LEVEL.	58
19	RELATIONSHIP BETWEEN AWARENESS OF BEEDI WELFARE SCHEME EDUCATIONAL LEVEL.	60
20	RELATIONSHIP BETWEEN UTILIZATION OF WELFARE SCHEME AND EDUCATIONAL STATUS.	61
21	RELATIONSHIP BETWEEN AWARENESS OF WELFARE SCHEME AND REGISTRATION OF WELFARE SCHEME.	62

XIX

22	RELATIONSHIP BETWEEN UTILIZATION OF WELFARE SCHEME AND AWARENESS OF WELFARE SCHEME.	63
23	TYPES OF MORBIDITY OF THE BEEDI WORKERS.	64
24	DISTRIBUTION OF BEEDI WORKERS WITH RESPECT TO SUGGESTIVE OF MUSCULOSKELETAL PROBLEMS.	65
25	DISTRIBUTION OF BEEDI WORKERS WITH RESPECT TO MUSCULOSKELETAL SYMPTOM.	66
26	RELATIONSHIP BETWEEN MUSCULOSKELETAL SYMPTOMS WITH AGE GROUP OF BEEDI WORKERS.	67
27	RELATIONSHIP BETWEEN OCCUPATIONAL DURATION AND MUSCULOSKELETAL PROBLEMS.	70
28	RELATIONSHIP BETWEEN WORKING PATTERNS AND MUSCULOSKELETAL PROBLEMS.	72
29	DISTRIBUTION OF BEEDI WORKERS WITH RESPECT TO RESPIRATORY PROBLEM.	73
30	RELATIONSHIP BETWEEN OCCUPATIONAL DURATION AND RESPIRATORY PROBLEMS.	74
31	RELATIONSHIP BETWEEN TOBACCO CONSUMPTION AND RESPIRATORY PROBLEMS OF BEEDI WORKERS.	76
32	DISTRIBUTION OF BEEDI WORKERS ACCORDING TO PULMONARY FUNCTION.	75

33	RELATIONSHIP BETWEEN RESPIRATORY PROBLEMS AND PULMONARY FUNCTION TEST IN SUB SAMPLE OF STUDY POPULATION.	77
34	HAND WASHING PRACTICE OF BEEDI WORKERS.	78
35	DISTRIBUTION OF CHRONIC ILLNESS OF THE BEEDI WORKERS	79

LIST OF FIGURES

Figure No.	Title of the Figure	Page No.
1	AGE DISTRIBUTION OF BEEDI WORKERS	39
2	SEX DISTRIBUTION OF BEEDI WORKER	40
3	DISTRIBUTION OF BEEDI WORKERS ACCORDING TO RELIGION	41
4	EDUCATION STATUS OF BEEDI WORKERS.	42
5	DISTRIBUTION OF BEEDI WORKERS ACCORDING TO MARITAL STATUS.	43
6	SOCIO ECONOMIC STATUS OF BEEDI WORKERS.	44
7	TYPE OF FAMILY DISTRIBUTION OF BEEDI WORKERS.	45
8	DISTRIBUTION OF BEEDI WORKERS ACCORDING TO YEARS OF BEEDI ROLLING.	47
9	DISTRIBUTION OF BEEDI WORKERS ACCORDING WORKING DAYS PER WEEK	48
10	DISTRIBUTION OF BEEDI WORKERS ACCORDING TO WORKING HOURS PER DAY.	49

11	DISTRIBUTION OF BEEDI WORKERS ACCORDING TO NO. OF BEEDIS ROLLED PER DAY.	50
12	DISTRIBUTION OF BEEDI WORKERS ACCORDING TO HOUSE TYPE	52
13	DISTRIBUTION OF INDOOR FACTORS	54
14	DISTRIBUTION OF TOBACCO AMONG BEEDI WORKERS	56
15	RELATIONSHIP BETWEEN EDUCATION LEVEL AND REGISTRATION STATUS OF WELFARE SCHEMES	58
16	RELATIONSHIP BETWEEN EDUCATIONAL LEVEL AND AWARENESS OF BEEDI WELFARE SCHEMES	60
17	RELATIONSHIP BETWEEN AWARENESS OF WELFARE SCHEME AND REGISTRATION OF WELFARE SCHEME.	62
18	TYPES OF MORBIDITY OF THE BEEDI WORKERS.	64
19	DISTRIBUTION OF BEEDI WORKERS WITH RESPECT TO TYPE OF MUSCULOSKELETAL PROBLEM.	65
20	DISTRIBUTION OF MUSCULOSKELETAL PROBLEM AMONG DIFFERENT AGE GROUP.	68

XXIII

21	CORRELATION BETWEEN MUSCULOSKELETAL PROBLEM AND AGE.	69
22	RELATIONSHIP BETWEEN OCCUPATIONAL DURATION AND MUSCULOSKELETAL PROBLEMS.	70
23	CORRELATION BETWEEN MUSCULOSKELETAL PROBLEM AND DURATION OF THE JOB.	71
24	DISTRIBUTION OF BEEDI WORKERS WITH RESPECT TO RESPIRATORY PROBLEMS.	73
25	RELATIONSHIP BETWEEN OCCUPATIONAL DURATION AND RESPIRATORY SYMPTOMS.	74
26	RESULTS OF PULMONARY FUNCTION TEST	76
27	HAND WASHING PRACTICE OF BEEDI WORKERS	78
28	DISTRIBUTION OF CHRONIC ILLNESS OF BEEDI WORKERS	79

LIST OF ANNEXURE

Annexure No.	Title of the annexure	Page No.
I	PROFORMA	102-105
II	CONSENT FORM	106-107
III	INFORMATION SHEET	108-114
IV	SOCIO ECONOMIC STATUS CLASSIFICATION(MODIFIED BG PRASAD CLASSIFICATION UPDATED AS PER AUGUST 2016 CPI)	115
V	AMERICAN THORACIC SOCIETY GUIDELINES	116-117
VI	SPIROMETRY - GOLD CRITERIA	118
VII	DEFINITION OF VARIABLES	119-121

Introduction

Workers represent half the world's population and are the major contributors to economic and social development of a country. Their health is determined not only by workplace hazards, but also by social and individual factors and also access to health services.¹

In 1950 , the WHO defined occupational health in terms of aim as : “The promotion and maintenance of the highest degree of physical, mental and social wellbeing of workers in all occupations; the prevention among workers of departures from health caused by their working conditions; the protection of workers in their employment from risks resulting from factors adverse to health ; the placing and maintenance of the workers in an occupational environment adapted to his physiological and psychological equipment ; and to summarize the adaptation of work to man and of each man to his job”.²

Industrialization and globalization are changing the visage of occupational morbidity drastically, all over the world. Traditionally, labour-oriented markets are moving towards greater automation and mechanization, paving way to more diverse set of occupation related diseases and injuries. At the

same time, general awareness about occupational safety, occupational and environmental hazards have not grown to the required extent in order to ensure adequate protection to the individuals involved in the so called mechanized era.³

Exposure to occupational hazards, increases the risk for morbidity and mortality. A hazard is anything with the potential of producing an adverse outcome and is omnipresent in industries.

The most common factors responsible for the occupational hazards are:

- 1) Physical hazards due to poor ventilation, poor illumination, noise, extreme temperatures, humidity and radiation
- 2) Biological hazards due to variety of pathogenic bacteria, fungi and parasites.
- 3) Chemical hazards due to hazardous gases and dusts, and

Unfortunately, a hazard is usually not identified until an accident or adverse incident occur, often producing lasting deformities and at times even death. The most prevalent occupational practices that increase the risks for morbidity and mortality are: lack of training in occupational health safety, lack of personal protective devices, inadequate training in the proper use of machinery and long hours of work. The situation is further compounded by overcrowding and poor sanitary conditions at workplace.

The major occupational diseases/ morbidities of concern in India are: silicosis, musculoskeletal injuries, coal worker's pneumoconiosis, chronic obstructive lung diseases, asbestosis, byssinosis, pesticide poisoning and noise-induced hearing loss.

India's population has crossed 1.21 billion according to recently released figures of the last government census carried out in 2011. Of these, 833 million reside in rural area and 377 million reside in urban area. Those in working age group are estimated to be 63.6%.

Unorganised or informal sector constitutes a pivotal part of the Indian economy. More than 90 per cent of workforce and about 50 per cent of the national product are accounted for by the informal economy. A high proportion of socially and economically underprivileged sections of society are concentrated in the informal economic activities. The high level of growth of the Indian economy during the past two decades is accompanied by increasing in informal sector.⁴

The Ministry of Labour, Government of India, has categorized the unorganized labour force under four groups in terms of occupation, nature of employment, specially distressed categories and service categories.

1. **In terms of Occupation:** Small and marginal farmers, landless agricultural labourers, share croppers, fishermen, those engaged in animal husbandry, beedi rolling, labelling and packing, building and construction workers, leather workers, weavers, artisans, salt workers, workers in brick kilns and stone quarries, workers in saw mills, oil mills etc. come under this category.
2. **In terms of Nature of Employment:** Attached agricultural labourers, bonded labourers, migrant workers, contract and casual labourers come under this category.
3. **In terms of specially distressed categories:** Toddy tappers, scavengers, carriers of head loads, drivers of animal driven vehicles, Loaders and unloaders come under this category.
4. **In terms of Service categories:** Midwives, domestic workers, fishermen and women, barbers, vegetable and fruit vendors, newspaper vendors etc. belong to this category.⁵

Beedi and cigar manufacturing is one of the traditional agro-based industry employing over 4.1 million workers in India. About 90 percent of them are “home workers” and majority of them are women.⁶ The standing committee on labour welfare by Ministry of Labour and Employment, Govt of India, noted that there are a number of players running illegal beedi companies through contractors and sub-contractors. These employers show in their records a very small number of people working under them whereas a large number of people are actually working under them, through their contractors and sub-contractors. Resultantly, these workers are not registered in the main employers, and therefore, not directly linked with a particular employer. Eventually, in the absence of their registration with any employer these workers are deprived of all the benefits under the Beedi Workers Welfare scheme.⁷

NEED FOR THE STUDY

Over 35 million people are involved in tobacco industry which includes farmers, farm workers, beedi workers, tendu leaf pluckers and traders. The actual number of beedi workers are much higher as there are many unorganized sectors enrolled in beedi manufacturing in India.⁸

Beedi making is mainly carried out by contractual, daily home based system where women and children are involved in this work. Beedi rolling causes serious occupational health hazards to the workers and their family who are constantly exposed to tobacco dust and hazardous chemicals, compounded by factors at the work place.⁹

Two types of occupational diseases have been identified in beedi workers. They are the injurious effect of inhaling tobacco dust and the other is a result of long hours of continuous sitting in an improper working posture.¹⁰

The occupational health hazards of beedi workers remain neglected for a long time and there is a need to study health problems among beedi workers and to reduce it.¹¹

The present study was intended to identify occupational health problems among beedi workers and suggest relevant remedial measures to control health hazards with regards to exposure and consequent occurrence of health hazards.

OBJECTIVES

1. To study the health problems among adult beedi workers.
2. To study the socio economic status and living condition of adult beedi workers.

REVIEW OF LITERATURE

OVER VIEW OF BEEDI INDUSTRY

The word bidi/beedi is derived from ‘beeda’ (a word in Marwari – a dialect of Hindi predominantly spoken by the trader caste from Marwar region of Gujarat and Rajasthan), which is a betel leaf-wrapped offering of betel nuts, herbs and condiments.¹²

A beedi consists of about 0.2 gram of sun-dried and processed tobacco flakes, rolled in a tendu leaf (*Diospyros elanoxylon*) or temburni leaf and held together by a cotton thread. The tobacco rolled in beedis is different from that used in cigarettes and is referred to as beedi tobacco.¹³

The tendu leaf constitutes 60% of the weight of the beedi.⁵ The beedi is four to eight cm in length. The diameter at the closed end is 0.6 - 0.8 cm and the width at the smoking end is 0.7- 0.9 cm.¹⁴

EMERGENCE OF BEEDIS IN INDIA

Beedi smoking was mentioned as early as 1711. Tribal people of ancient India used to smoke tobacco in a pipe made from leaves of trees, hence the practice of wrapping tobacco in a leaf probably originated.¹⁵

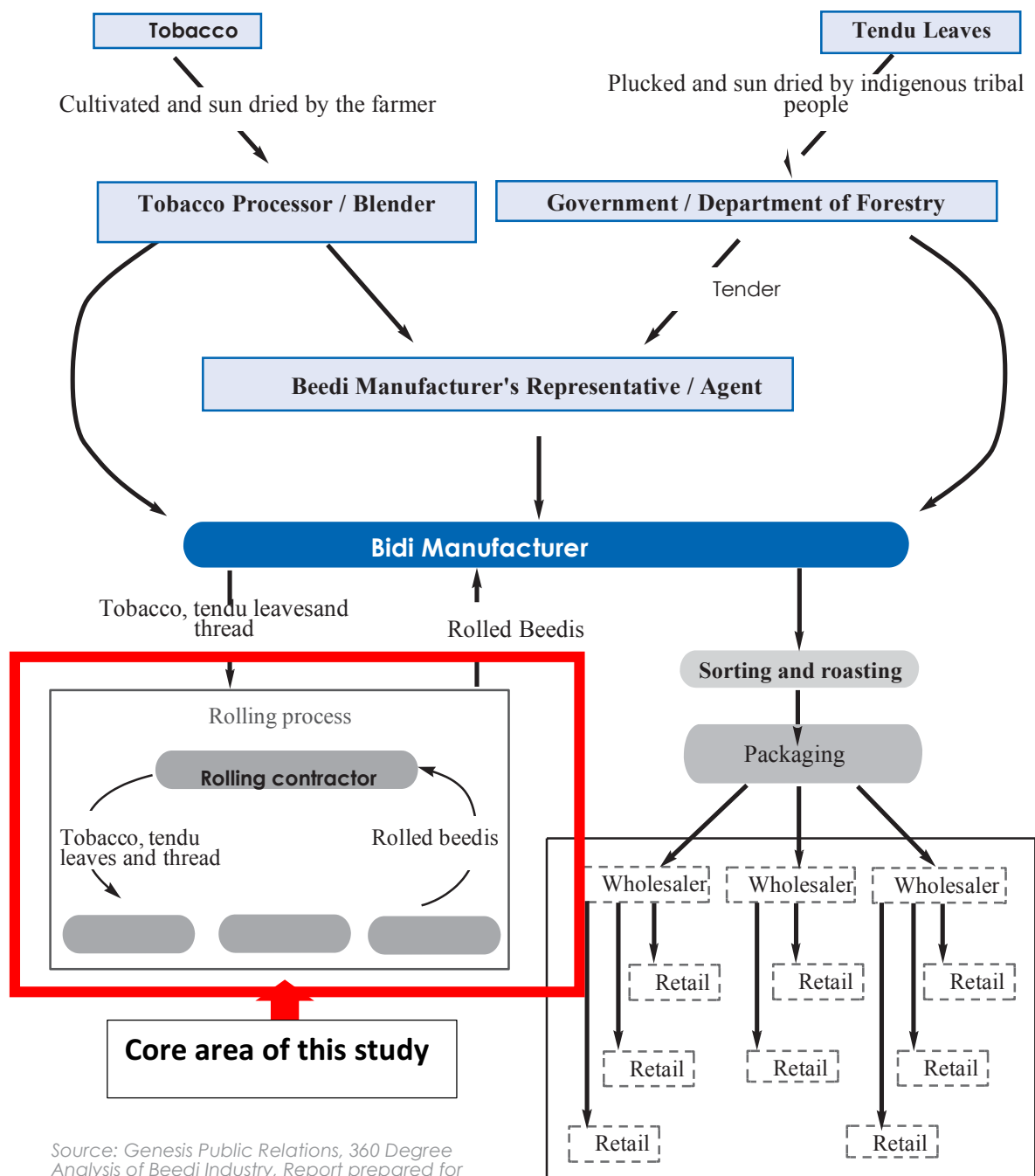
Beedis first appeared along the east coast of India in the early part of the eighteenth century and were sold in bundles of 20 to 30. There is no definite information as to when and how the manufacturing of beedis started in India. According to a report of the Labour Investigation Committee, appointed by the Government of India in 1946, merchants from Gujarat introduced the manufacture of Beedi in Madhya Pradesh, in the first decade of the twentieth century. The Court of Inquiry into Labour Conditions in Beedi report published by the Government of Madras in 1947 mentions that the oldest beedi-making unit was established as early as 1887 This is in concurrence with the International Labour Organization's estimate that the Indian beedi industry started around 1900.¹⁶

PATTERN OF BEEDI CONSUMPTION IN INDIA

In terms of tobacco consumed, beedis command 48 percent of the market while chewing tobacco commands 38 percent and cigarettes 14 percent. Thus, by weight, beedis account for 77 percent of the market for beedis and cigarettes (i.e., the market for smoking tobacco).

Although there are no specific figures of how many beedis are produced or consumed annually due to the fragmentation of beedi manufacturing and distribution, estimates range from 750 billion to 1.2 trillion. In year 2005/06, 106 billion cigarettes were consumed in India. Thus roughly 10 beedis are consumed in India for each cigarette.¹⁷

MANUFACTURING AND PRODUCTION



Processing of beedi tobacco does not require much technology and involves four stages: drying, flaking, storing, and blending. First the farmer sun-dries the tobacco leaves. Agents begin to purchase dried tobacco leaves in the months of February and March. Tobacco processors, usually women, tear the stalks out of the leaves, after which the tobacco is pounded into flakes and winnowed to separate out the ribs. In factories, machines pound the leaves. Otherwise, women manually beat the dried leaves into flakes. The crushed leaves are sieved to obtain various sizes of flakes. The agent stores the processed tobacco for 6-12 months for ageing. Before dispatching the flakes to the beedi manufacturer, the processor blends tobacco flakes from different cultivars and grades them in fixed proportions according to the manufacturer's requirements for the desired composition and flavour. A small amount of crushed stems and ribs is added to improve combustibility.¹⁸

Beedi making essentially involves six steps. The first three are wetting, drying and cutting the tendu leaves. These are followed by placing tobacco inside the tendu leaf, rolling the leaf and securing it with a thread.

Beedi rollers handle tobacco flakes and inhale tobacco dust and volatile components of tobacco in their work environment (often their homes) and are at risk for genotoxic hazards.¹⁹

Beedi rolling began in the organized sector during the early 20th century, but gradually shifted to the unorganized sector, consisting of households, small unincorporated units and workshops. This was primarily to evade government regulations enacted to protect workers' welfare, which also had tax implications. Being essentially a cottage industry now, only ten percent of beedis are produced in factories. Based on the degree of organization and location, beedi production could be classified into three categories: home-based production (cottage industry), cooperatives, and factory based production.

ROLE OF WOMEN IN THE BEEDI INDUSTRY

There are varying estimates of female involvement in beedi rolling. One source estimated that, women constitute 76% of the total employment in beedi manufacturing industry. The All India Beedi, Cigar and Tobacco Workers Federation pegs the figure at 90% to 95%.²⁰

The beedi industry is male-dominated, where the manufacturer, the contractor and the consumers are male and only the beedi rollers are female. This often makes women subject to economic exploitation. Female beedi rollers also report verbal and physical abuse based on gender and caste differences.²¹

OCCUPATIONAL MORBIDITY

Occupational factors make an important contribution to the global burden of diseases. Work-related morbidity and mortality results in suffering and hardship for the worker and his/her family, but also add to the overall cost to the society through lost productivity and increased use of medical and welfare services.²²

WHO reports that occupational risk factors account globally for a number of morbidity conditions including: 37% of back pains, 16% of hearing loss, 13% of chronic obstructive lungs disease, 11% of asthma, 10% of injuries, 9% of lung cancer and 2% of leukaemia. According to the report, mortality is also due to work related injuries causing nearly 310,000 deaths each year and nearly 146 000 deaths are attributable to work related carcinogens. The dust-related deaths are placed at 243 000.²³

Work related musculoskeletal disorder are considered an important source of occupational morbidity, caused or aggravated by forceful, repetitive and awkward movements with insufficient rest or recovery time. Factors responsible for work related musculoskeletal are of three types namely a) personal to workers (such as age, sex, physical strength and threshold for complaint), b) factors particular to the working environment (such as job task, workplace psychological condition) and c) factors arising outside work. Back pain was the most common complaint, followed by disorders of upper limb and neck.²⁴

An epidemiological survey for respiratory diseases among industry workers such as bakeries, poultry farms, granaries and a sugar refinery in India by Singh A B et al revealed that 40-59% of workers in different occupational work environments suffered from one or more respiratory ailments. A higher incidence of respiratory disorders was recorded in workers with longer duration of employment. As much as 36-40% of the workers reported work-related symptoms.²⁵

A study undertaken among tobacco workers during seventies, an revealed an elevated level of nicotine in the urine samples among those exposed to tobacco, which was causing several physical problems.²⁶

The International Labour Organization also cites ailments such as exacerbation of tuberculosis, asthma, anemia, giddiness, postural and eye problems, and gynaecological difficulties among beedi workers.²⁷

A study on health profile of 439 beedi workers in the coastal region of Mangalore revealed 55% had illness at work, 34.6% had musculoskeletal problem, 31% had eye symptoms and 12% had respiratory symptoms.¹¹

In Amarchinta, Andhra Pradesh the study on occupational health hazards among beedi workers revealed 75% males and 65% females were suffering

from shoulder pain, 27% suffered from cough and 20% from breathlessness.²⁸

A study on working condition and health hazards among beedi rollers in the urban slums of Mumbai revealed 88% of beedi rollers were suffering from weakness and fatigue, 78.8% were suffering from lower back ache and 42.3% from knee pain.²⁹

In Tamil Nadu, a study among 400 women beedi rollers without tobacco smoking/chewing habits were studied for occupation related exposure to tobacco flakes. Among them 70% of beedi workers suffered from gastrointestinal and nervous problems and more than 50% suffered from sore throat and cough.³⁰

A study on ocular manifestation among 310 female beedi workers in Tirunelveli revealed 2.9% had defective vision, 53.6% had dull headache and 38.1% had irritation / foreign body sensation.³¹

A study conducted among 107 male workers exposed to tobacco dust in unorganized sectors revealed 23.53% had respiratory impairments like restrictive, obstructive and combined among the exposed, 3.56% among controls.³²

Study done by Gopal M, among home based women beedi workers in Tirunelveli District Tamil Nadu reported five main symptom groups which includes aches and pain like backache, neck pain, headache, pain in legs and numbness of fingers in 65% respondents, cough in 9% respondents, stomach related problems among 8%.³³

Shahla Yasmin et al. in their study among 197 female beedi rollers in Patna, Bihar showed that more than 70% of beedi rollers suffered from eye, gastrointestinal and neurological problems while more than 50% of them suffered from respiratory problems, mostly throat burning and cough and more than 75% respondents suffered from osteological problems.⁵⁵

The study conducted by Voluntary Health Association of India concluded that around 75% of about 44 lakh beedi workers in the country suffer from multiple illness due to continuous exposure to tobacco and other hazardous substances.³⁴

Study done by Rajasekhar and Sreedhar among women beedi workers in Dakshina Kannada District in Karnataka reported that about half of the

respondents had health problems on account of their involvement in beedi activity. The most common problems experienced were backache (25%), eye problem (7%), headache (3%), asthma (6%).³⁵

Results from a health survey of women beedi workers conducted by Rao in Jabalpur, Madhya Pradesh reported several occupation specific health problems like backache and joint pains, giddiness, headache, eye problems like watering, burning and poor vision. About 50-70% women reported having gynaecological and related problems. These problems were genuine but by and large went unnoticed and unattended.³⁶

STANDARDIZED NORDIC QUESTIONNAIRE

Standardized Nordic questionnaire (SNQ) is a questionnaire designed to standardise the recording and analysis of work related musculoskeletal disorders among various populations. This standardisation helps to compare results between the populations. Supported by the Nordic Council of Ministers, a project was undertaken to develop and test standardized questionnaires on general, low back and neck/shoulder complaints.

SNQ consists of structured, binary or multiple choice questions. It consists of two parts; one is a general questionnaire, which contains the demographic

details of the individual, closed ended questions about their area of pain or discomfort and a body chart that defines the areas of the body and serves as a reference tool while filling the questions. The second part of the questionnaire has specific sub sections for neck, shoulders and low back. The purpose of the general form is to identify the areas of trouble and the specific one, is for better analysis of the commonly affected areas in work related musculoskeletal disorders.

SNQ was developed with the purpose of serving as a screening tool for assessing the individuals' risk of developing work related musculoskeletal disorders also for assessing and providing health care services, and to measure the outcome of epidemiological studies on musculoskeletal disorders. Screening may serve as a diagnostic tool for analysing the work environment, workstation and tool design and help make the necessary changes so as to prevent the development of work related musculoskeletal disorders.³⁷

ACTS APPLICABLE TO BEEDI ROLLERS³⁸

Apart from the various acts governing the industrial environment, specific acts have been enacted by the Government of India to safeguard the welfare of the beedi rollers in factory.

The various acts are as follows:

- Payment of Wages Act, 1936
- Industrial Employment (Standing Orders) Act, 1946
- Maternity Benefit Act, 1961
- Chapter IV and Section 85 of the Factories Act, 1948
- Industrial Disputes Act, 1947
- Workmen's Compensation Act, 1923
- Payment of Gratuity Act, 1972
- Minimum Wages Act, 1948
- Child Labour (P&R) Act, 1986

The law which directly deals with the beedi workers are:

1. The Beedi and Cigar Workers (Conditions of Employment) Act 1966
2. The Beedi Workers Welfare Cess Act, 1976
3. The Beedi Workers Welfare Fund Act 1976

The salient features of the Acts:

1. Beedi and Cigar Workers (Conditions of Employment) Act, 1966.

It provides for coverage regarding daily hours of work, weekly rest, leave with

wages, maternity leave benefits and welfare amenities such as drinking water, toilet facilities, canteen, etc. Although the term worker encompasses home workers as well, in practice these provisions apply only to the factory/ common shed workers.

The Act does not apply to the occupier or owner of a private dwelling house involved in the manufacturing process with the help of his family or anybody who is dependent on him, provided the owner or occupier is not an employee of an employer to whom the Act is applicable. Also prescribed in the statute are measures to promote healthy working conditions of workers at workplace in terms of cleanliness, ventilation, first aid, etc.

2. **The Beedi Workers Welfare Cess Act, 1976** aims to collect taxes by way of cess or by imposing excise duty on manufactured beedis.

3. **The Beedi Workers Welfare Fund Act, 1976** was enacted with the objective to promote financial assistance to the workers. The Beedi Workers Welfare Fund Rules, 1978 stipulate that the owner of an establishment or a factory or contractor should maintain a register of works and furnish statistics and other information as required by the government from time to time. Employers are to provide photo identity cards to every worker. The main emphasis of the welfare measures is in the health sector as the beedi workers as a category of workers are involved in an occupation having health hazards.

PURPOSE	NATURE OF ASSISTANCE
Ophthalmic Problems	Financial assistance of Rs.300/- for purchase of spectacles
Tuberculosis	Reservation of beds in T. B. Hospitals and domiciliary treatment for workers. Subsistence allowance Rs.750/- p.m. to Rs.1000/- is paid to workers.

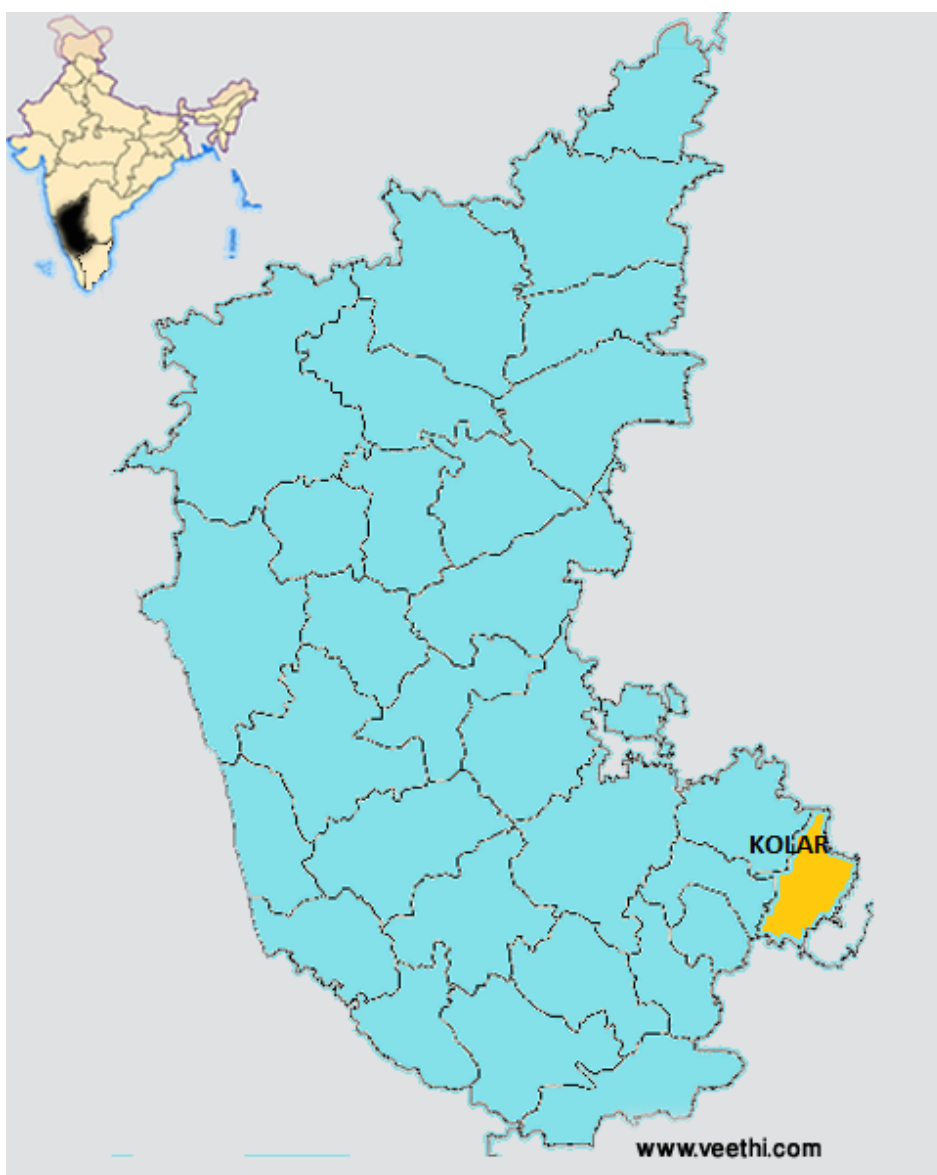
Heart Diseases	Reimbursement of expenditure up to Rs.1,30,000/- to workers.
Kidney Transplantation	Reimbursement of expenditure up to Rs.2,00,000/- to workers.
Cancer	Reimbursement of actual expenditure on treatment, medicines, and diet charges incurred by workers, or their dependants.
Minor surgery	Reimbursement of expenditure upto Rs.30,000/- to workers and their dependants.
Mental Diseases	Financial assistance for treatment of mental diseases, diet, railway fare and subsistence allowance to workers.
Leprosy	Financial assistance for Rs.30/- per patient per day for indoor treatment and Rs.6/- per patient per day for outdoor treatment to workers. Subsistence allowance of Rs.300/- per month with dependants and Rs.200/- per month without dependants for workers.

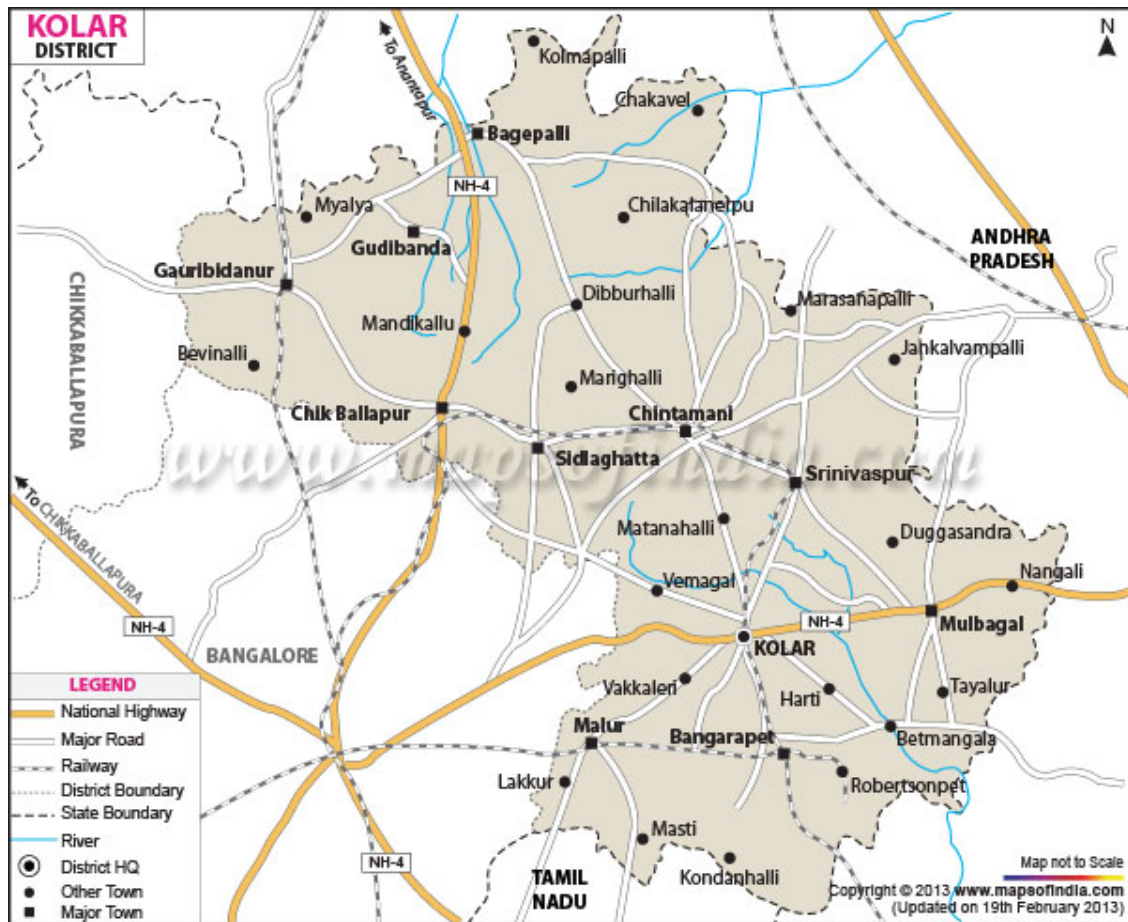
Maternity Benefits	Grant of Rs.1000/- per delivery to a female worker (for first two deliveries).
Family Welfare	Monetary incentive @ Rs.500/- per head to the workers for undergoing sterilization

Materials and methods

TOPOGRAPHY OF KOLAR DISTRICT

Kolar is a district of Karnataka state with an area of about 3979 sq.km situated between 12° 46' and 13° 58' north latitude and 77° 21' and 78° 35' east longitude and comprise a population of 1,536,401. It consists of five taluks viz., Mulbagal, Kolar, Bangarpet, Malur and Srinivasapura.³⁹





BEEDI WORKERS OF KOLAR

There are a total of 11400 registered beedi workers in Kolar district, In Kolar city alone, there are more than 5,000 beedi workers. The actual number may be higher since most of the beedi workers belong to unorganised sectors and it is difficult to obtain the actual number. Beedi workers roll beedi's day and night at Noor Nagar, Rehamat Nagar, Millat Nagar, Beedi Colony, Shainsha

Nagar and other areas in the city that have a predominant Muslim population.

There are about 12 beedi factory in Kolar district as per Beedi Welfare Association namely Joythi Beedi Industry, Roshan Beedi Factory, Star Beedi Factory, Sharadha Beedi Factory etc. In each beedi factory there are about 10-15 beedi contractors, each contractors supplies tendu leaves, tobacco and thread to 30 to 40 beedi workers, who are involved in beedi rolling at the house.

Study setting:

Beedi workers in beedi colony (area) in Kolar city



Study Population:

Beedi workers (both gender) between 18 to 50 years of age involved in the profession for at least 12 months.

Study design: A cross sectional study

Study duration: 1st November 2014 to 31st October 2015 (One year)

Sample size:

Based on the prevalence rate of the various morbidities from the previous study¹¹, sample size was calculated using the formula.

$n = Z^2 pq / d^2$, where $Z=1.96$, p =prevalence rate, $q=(1-p)$, d = absolute error (5%) at 95% CI (Confidence Interval)

Prevalence of musculoskeletal disorders -34.6%

Prevalence of eye problems-31%

Prevalence of Respiratory problems-12.07%

The sample size

For musculoskeletal disorders

$$n = 1.96^2 \times 34.6 (100-34.6) / 5^2$$

n=348

For eye problems

$n = 1.962 \times 31(100-31)/52$

n= 329

For respiratory problems

$n = 1.962 \times 12.07(100-12.07)/52$

n=164

The highest sample size of 348 for musculoskeletal disorders was considered. Adding 10% to this sample size for possible non-compliance, a total of 384 ($348+34=382 \approx 384$) was arrived.

Inclusion criteria:

All beedi workers (both gender) aged between 18 to 50 years, currently engaged in beedi rolling job for at least 12 months in an urban population.

Exclusion Criteria:

1. Beedi workers with thoracic cage abnormalities.
2. Beedi workers with recent chest and abdominal surgery.

3. Beedi workers with any known respiratory disease like asthma and COPD prior to joining the in beedi work.
4. Individuals not giving consent for the study.

Sampling technique:

Two stage sampling. Sampling was carried out in two stages as follows:

Stage I: All the areas (wards) involved in beedi rolling were enlisted. Among the areas enlisted areas are selected randomly until the sample size of 384 is fulfilled.

Stage II: In each selected area approximate centre of the area was located. A random direction of travel was selected from the centre of the area, and then the starting house was selected randomly. The beedi workers in each house were interviewed, and next nearest household was selected. Population probability to size in each area was taken until the required sample was achieved, if not fulfilled in a particular lane, other lane in same area was selected randomly until required sample size was met, similar procedure was followed in other areas.

Study Tools:

Pilot study:

Total of 20 beedi workers from area other than the areas included for study was considered fulfilling the inclusion and exclusion criteria were interviewed and examined during one month of pilot study to validate the questionnaire and make any changes if necessary.

a) Proforma (Annexure-1), which consists of following 3 parts.

Section A: Demographic data which gives base line information of the workers such as age, marital status, religion, educational status, income, habits.

Section B: Structured interview schedule to assess, the working condition, length of working hours per day and years of service in the beedi making and practice of safety measures among beedi workers.

Section C: Structured interview schedule to assess, the occupational health problems like respiratory problems, musculoskeletal disorders, and other health problems among beedi workers.

Pretested semi structured questionnaire was administered using interview method.

b) Investigation (Spirometry performed on sub-sample of the study subject)

Data collection:

Written consent:

Informed written consent explaining the purpose of the study was taken from all participants after assuring confidentiality of information in the language they were familiar and comfortable in understanding. **(Annexure No II)**

Data collection process:

After building the rapport, participants were requested to spare 30 minutes for interview. Using pretested questionnaire, complete information regarding the socio-demographic, working condition, length of working hours per day and years of service in the beedi making and practice of safety measures was collected from beedi workers.

After completion of the oral interview, anthropometric measurements comprising of height and weight were recorded.

Anthropometric Measurements.

a) Weight: The digital weighing machine was regularly standardized with a known weight. The study subjects were instructed about the procedure. Subjects were informed to wear light clothing and to stand barefoot on The digital weighing scale. The scale was readjusted to zero after weighing each subject. The subjects were supervised for posture while standing on the weighing machine. They were made to stand erect with both feet together without any support, looking straight with vision fixed on a point on the opposite wall such that the plane of vision was perpendicular to their body and parallel to the ground. The measurements were recorded to the nearest 50gm.

b) Height: Measurements were plotted on the wall using a non-elastic measuring tape for recording the height. Erect heights were obtained with the subjects standing barefoot on the flat surface, against the vertical wall with occiput, buttocks and heel touching the wall and arms hanging freely on the sides. They were instructed to fix their vision on a point of opposite wall/a distant object in Frankfurt plane. A none-elastic ruler was used to localize the upper limit of height measurements. Height measurements were recorded to the nearest 1cm.

A detailed history regarding any past and present history of musculoskeletal and respiratory morbidities was recorded.

Spirometry was performed among the (20%) subset of the sample after explanation and demonstration of the required procedure. The subject was asked to take deep inspiration from the environment followed by forceful expiration into the mouth piece of the instrument in standing posture. The mouth piece was required to be inserted without leak of air or obstruction by the lips or the teeth and forced expiration continued to completion without a pause and without leak of air around the mouth piece. Subjects were asked to repeat the procedure three times and the best one was taken. A new mouth piece was used for every subject to prevent any cross infection if any.

Any other illness were asked about and relevant treatment was provided as a part of the health check drive as an incentive for participation in the study.

LUNG VOLUMES AND CAPACITIES

All lung volumes and capacities obtained (FVC, FEV1, PEF, and FEV1/FVC ratio) were expressed with correction for body temperature at the ambient pressure, saturated with water vapour (BTPS).⁴⁰

1. Forced Vital Capacity (FVC) is the total volume of air that is exhaled during a forced exhalation after maximal inhalation and it is reported in litres (normal 4.5-5 L/sec).

2. Forced Expiratory Volume in 1st second (FEV1) is the fraction of vital capacity during the 1st second of forceful expiration. Normally 80-85% of the forced vital capacity is expired in the 1st second (3-4.5L), 95-97% in 2nd second (FEV2) and 97-100% in 3rd second (FEV3).

3. Peak Expiratory Flow Rate: is the maximum flow rate achieved during the manoeuvre measured in L/min or L/sec. (Normal -500L/min). Peak flow is largely a function of the large airway caliber.

4. FEV1/FVC

Forced expiratory volume (FEV) expressed as a percentage of the Forced vital capacity (FVC)

FEV1/FVC

>70% - Normal

<70% - Mild obstruction

<60% - Moderate obstruction

<50% - Severe obstruction⁴¹

STATISTICAL ANALYSIS:

The collected data was entered in Microsoft Excel and analyzed using SPSS version 22. Prevalence of respiratory, ocular, musculoskeletal and other health problems were analyzed descriptively using percentages and frequency tables. Relationship between variables were analyzed using Chi-square test, $p < 0.05$ was considered as statistically significant.

RESULTS

Table 1: Age distribution of the beedi workers.

Age group (years)	No. of Workers	Percentage
18-24	31	8.1
25-34	101	26.3
35-44	111	28.9
45-55	104	27.1
≥ 55	37	9.6
Total	384	100

The above table shows that majority of the beedi workers 111 (28.9%) were in the age group 35 to 44 years, and least 31 (8.1%) in 18 to 24 years age group.

The mean age of the beedi workers was 39.86 years with standard deviation of 11.66.

Figure 1 Age distribution of beedi workers

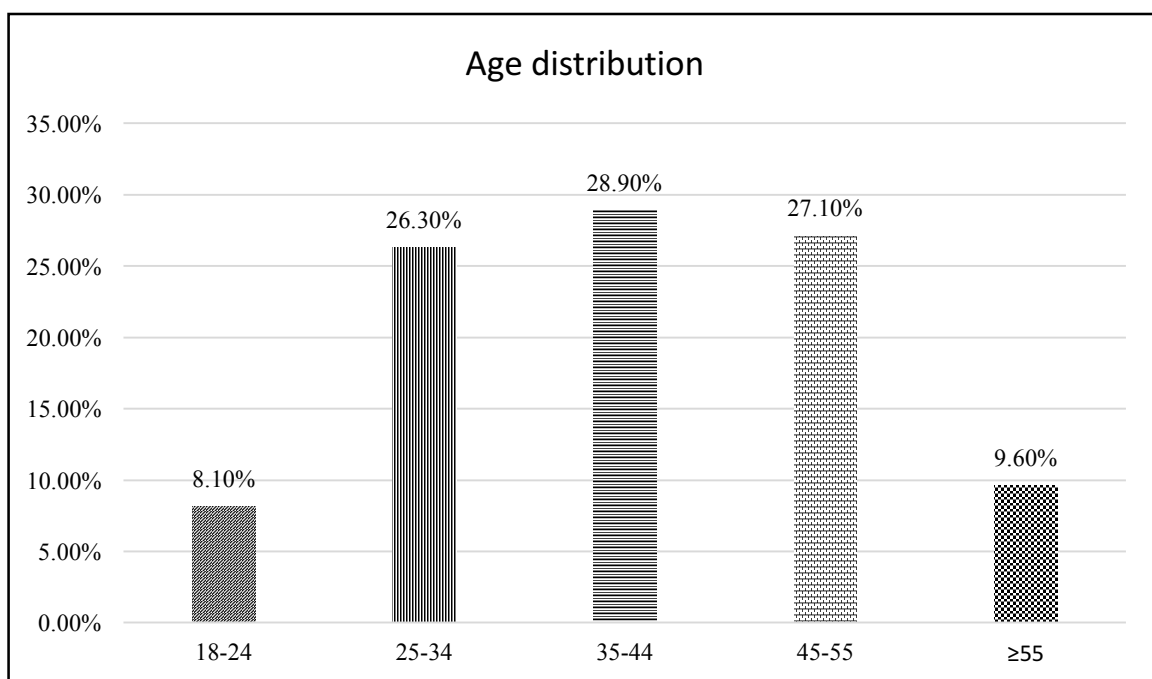


Table 2: Sex distribution among the beedi worker.

Sex	No. of Workers	Percentage
Male	13	3.4
Female	371	96.6
Total	384	100.0

The above table shows that out of 384 beedi workers, 371 (96.6%) were females and 13(3.4%) were males.

Figure: 2 Sex distribution of beedi workers.

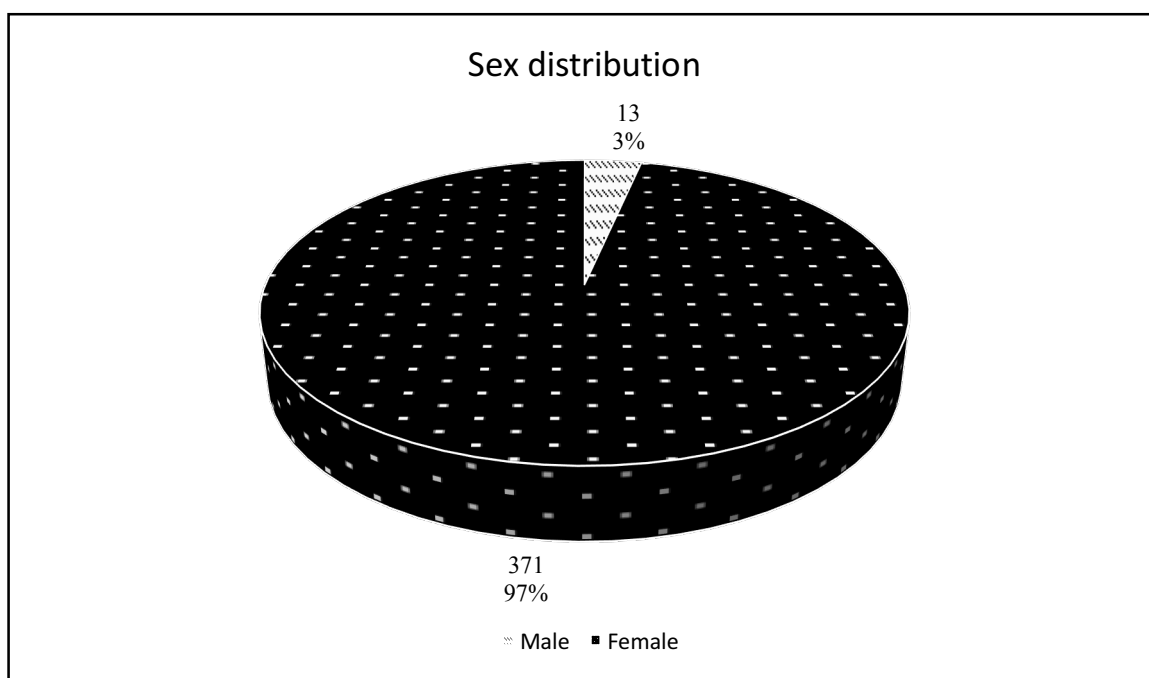


Table 3: Distribution of beedi workers according to religion.

Religion	No. of Workers	Percentage
Hindu	15	3.9
Muslim	355	92.4
Christian	14	3.6
Total	384	100.0

The above table shows that, 355(92.4%) were Muslims, 15(3.9%) were Hindu and 14(3.6%) were Christians.

Figure 3: Distribution of beedi workers according to religion

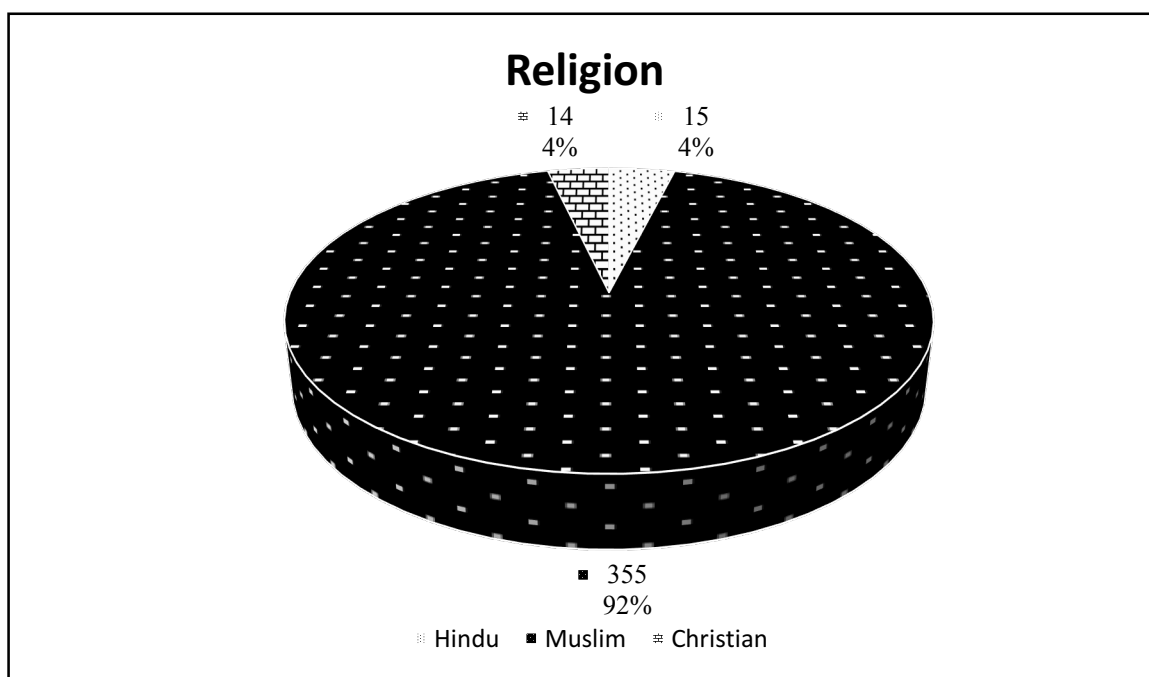


Table 4: Education status of beedi workers.

Education status	No. of Workers	Percentage
Illiterate	96	25.0
Primary school	96	25.0
Middle school	120	31.3
High school and above	72	18.8
Total	384	100.0

The above table shows that 25% were illiterates and 75% were literates. Majority of beedi workers, 120 (31.2%) studied up to middle school.

Figure 4: Education status of beedi workers.

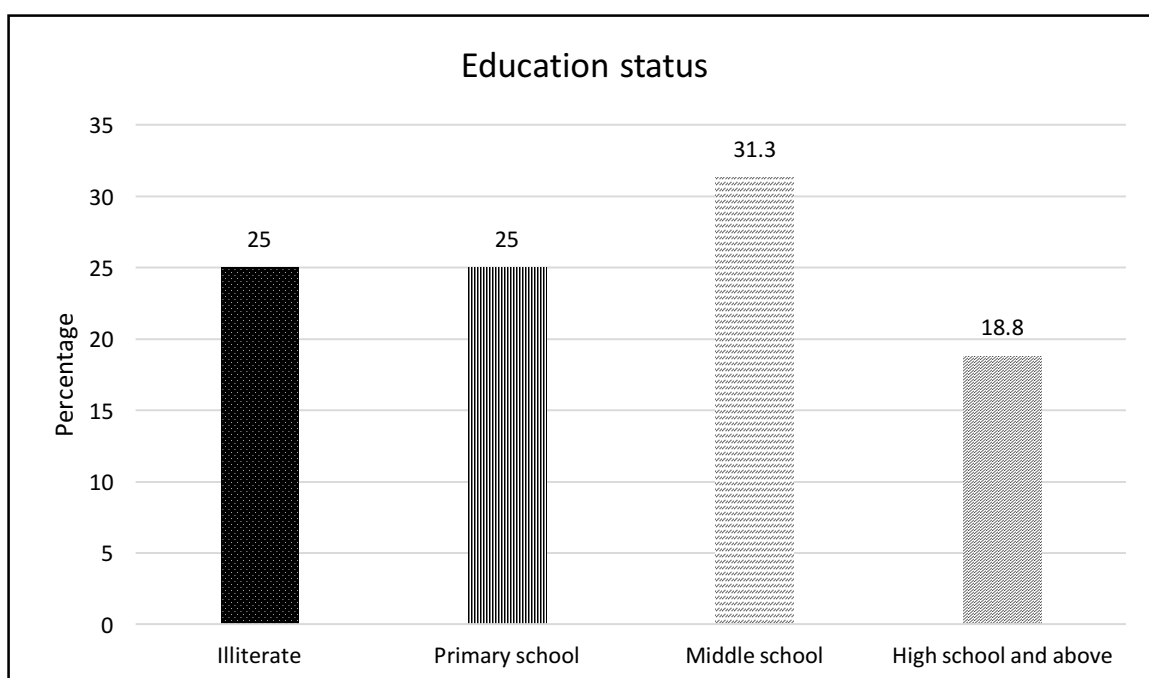


Table 5: Distribution of beedi workers according to marital status.

Marital status	No. of Workers	Percentage
Married	296	77.1
Unmarried	13	3.4
Widow	8	2.1
Divorce/separated	67	17.4
Total	384	100.0

The above table shows that 296 (77.1%), 67 (17.4%), 13(3.4%) and 8 (2.1%) were married, divorce/separated, unmarried and widows, respectively.

Figure 5: Distribution of beedi workers according to marital Status.

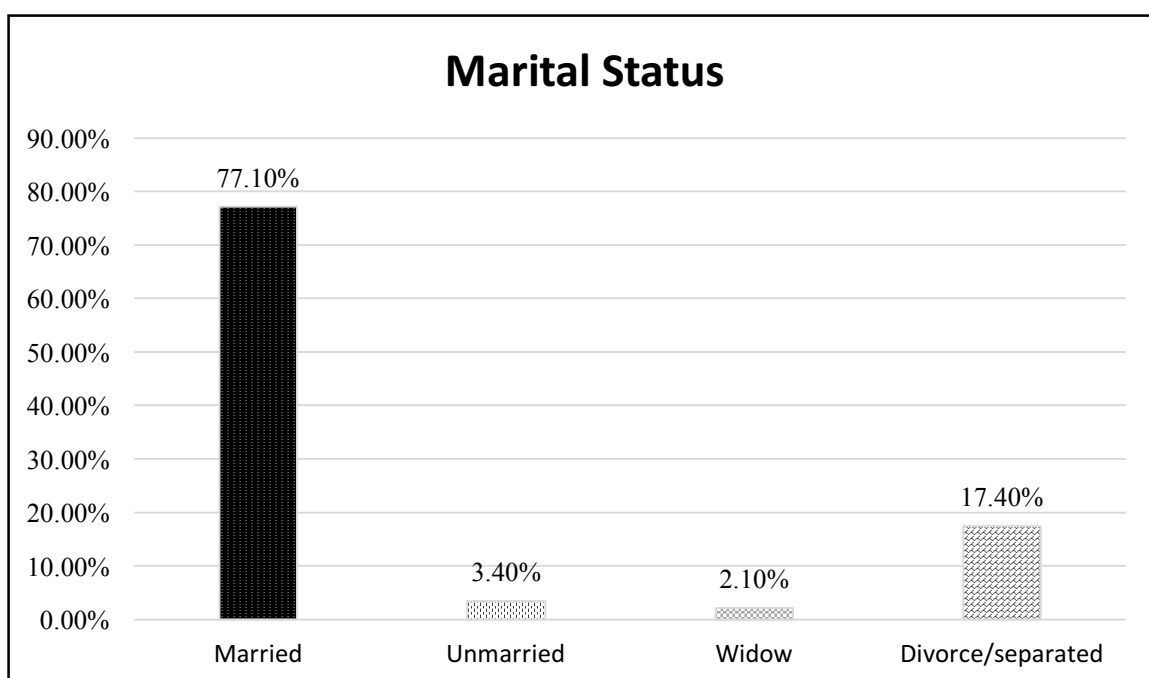


Table 6: Distribution of beedi workers according to socio economic status.

Socio economic status	No. of Workers	Percentage
Class V	150	39.1
Class IV	214	55.7
Class III	18	4.7
Class II	2	0.5
Class I	0	0
Total	384	100.0

The above table shows that 214(55.7%) belonged to class IV, 150(39.1%) belonged to class V, 18 (4.7%) belonged to class III, 2(0.5%) belonged to class II and while none belonged to class I as per modified B G Prasad's classification for the month of February 2016.

Figure 6: Socio economic status of beedi workers.

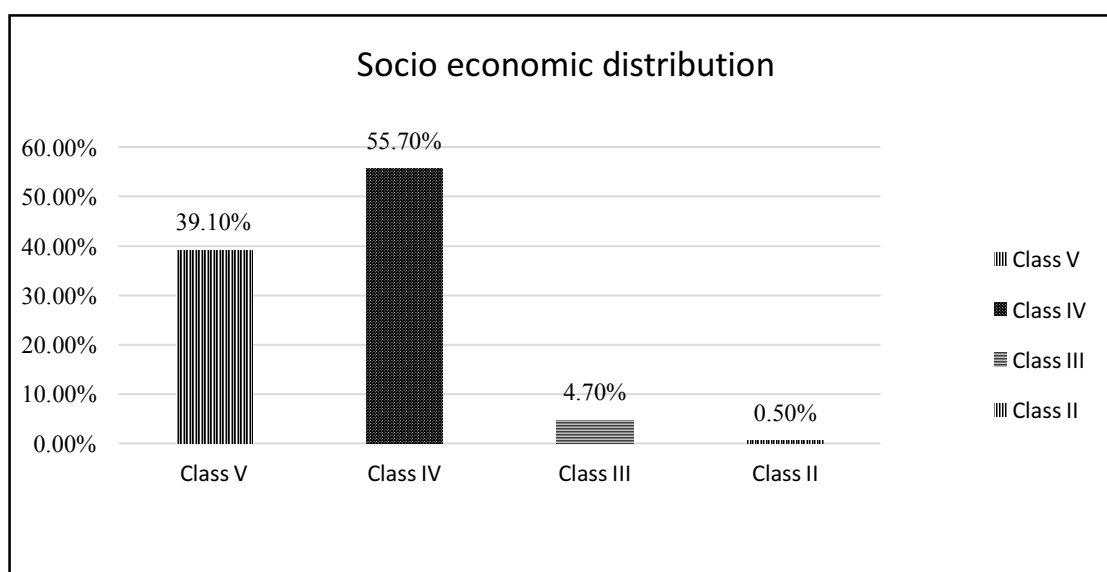


Table 7: Distribution of beedi workers as per type of family.

Type of Family	No. of Workers	Percentage
Nuclear Family	225	58.6
Joint Family	100	26.0
Three Generation Family	59	15.4
Total	384	100.0

The above table shows that 225(58.6%) belonged to nuclear family, 100(26%) belonged to joint family and 59(15.4%) belonged to a three generation family.

Figure 7: Type of family distribution of beedi workers.

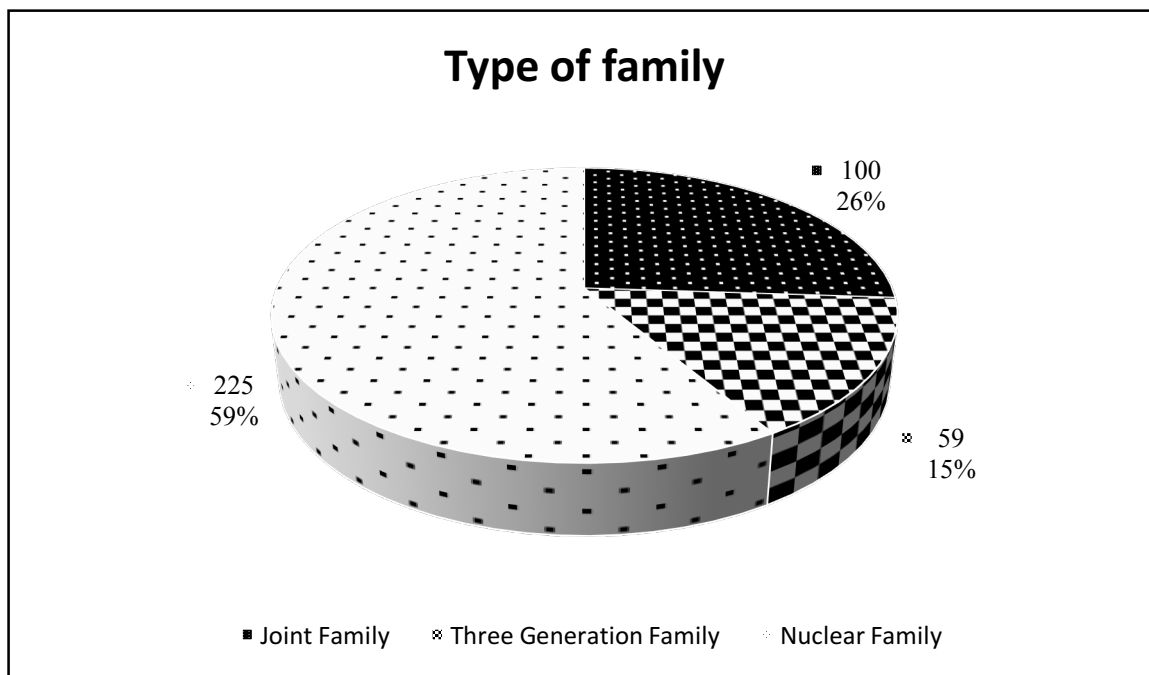


Table 8: Distribution of beedi workers according to duration of beedi rolling.

Duration of Beedi Rolling (in years)	No. of Workers	Percentage
<5	79	20.6
5-10	31	8.1
11-15	67	17.4
16-20	56	14.6
>20	151	39.3
Total	384	100.0

The above table shows that majority of the beedi workers 151(39.3%) were working for more than 20 years, 79(20.6%) of them working for less than 5 years as beedi workers and only 31 (8.1%) were working for five to ten years. Mean duration of work was 15.7 years with a SD of 8.57.

Figure 8: Distribution of beedi workers according to years of beedi rolling.

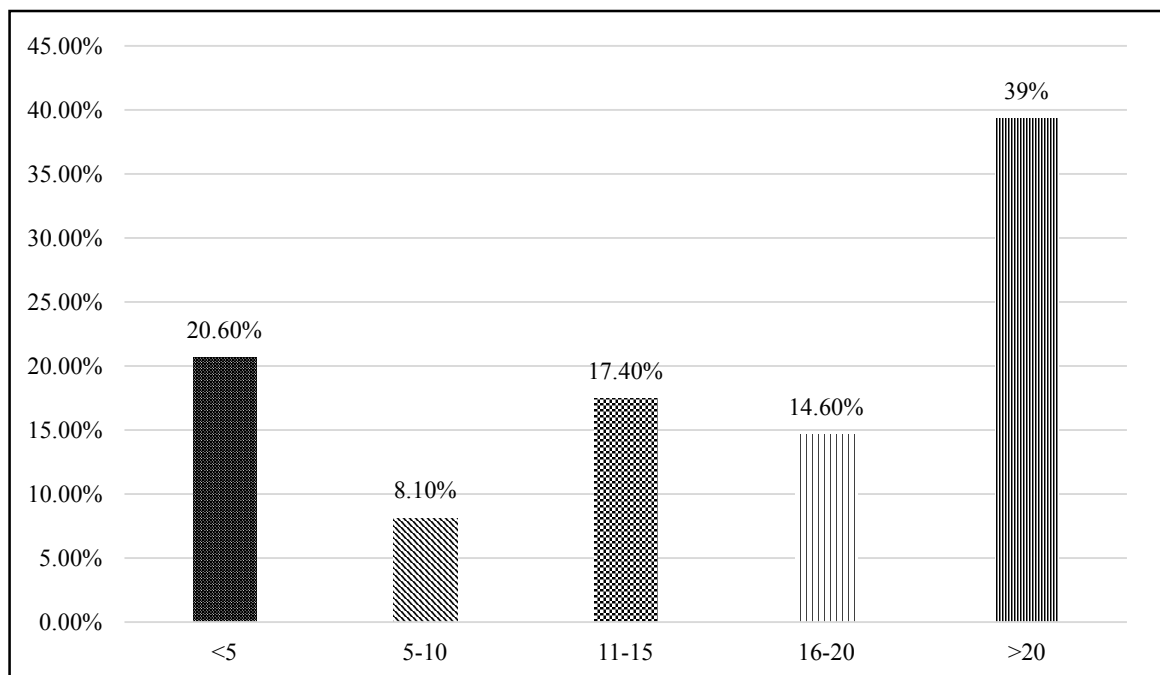


Table 9: Distribution of beedi workers according to number of working days per week.

Working days per week	No. of Workers	Percentage
< 3	24	6.3
3-5	159	41.4
>5	201	52.3
Total	384	100.0

Above table shows that 201 beedi workers (52.3%) out of 384 were working for more than 5 days in a week, followed by 159 (41.4%) for 3-5 days and 24 (6.3%) for less than 3 days. Mean no of days per week was 5.58 days with a SD of 1.259.

Figure 9: Distribution of beedi workers according to working days per week.

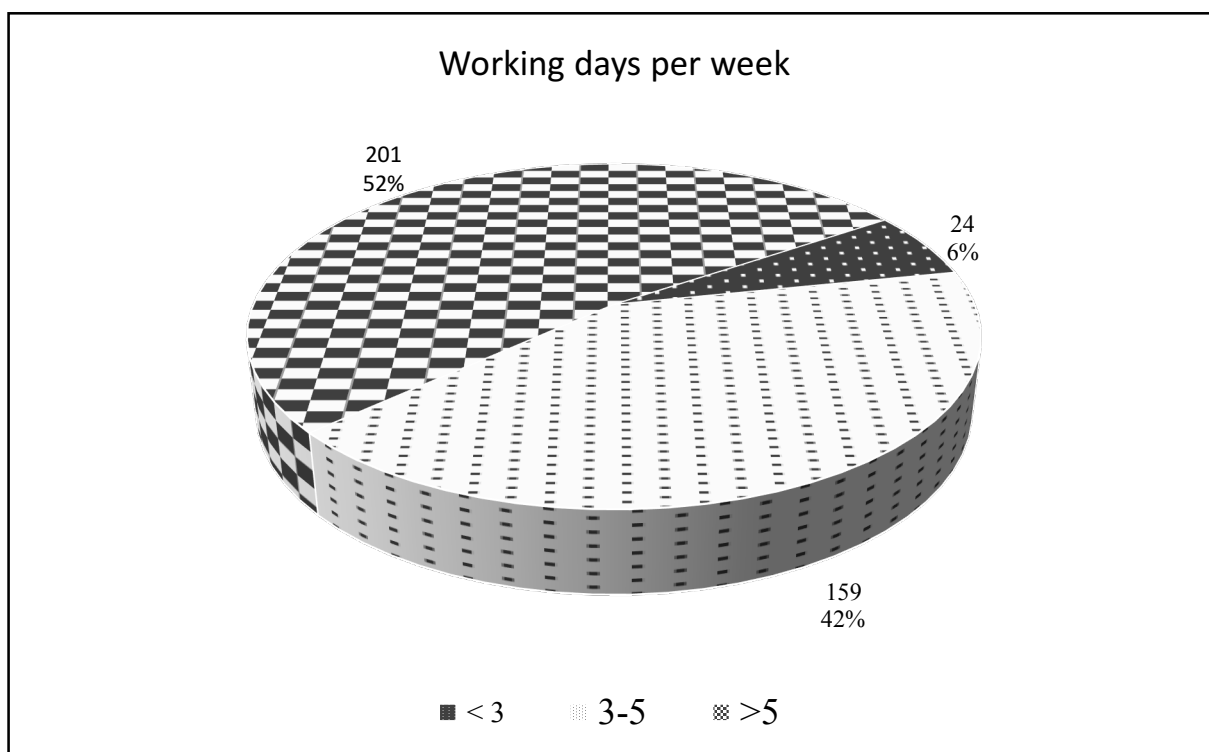


Table 10: Distribution of beedi workers according to working hours per day.

Working hours per day	No. of Workers	Percentage
< 3	40	10.4
3-5	211	54.9
>5	133	34.6
Total	384	100.0

Above table shows that 211 beedi workers (54.9%) out of 384 were working 3 to 5 hours per day, followed by 133 (34.6%) more than 5 hours in a day and only 40 (10.4%) for less than 3 hours in a day.

Mean no. of hours per day was 5.06 with SD of 1.52.

Figure 10: Distribution of beedi workers according to working hours per day.

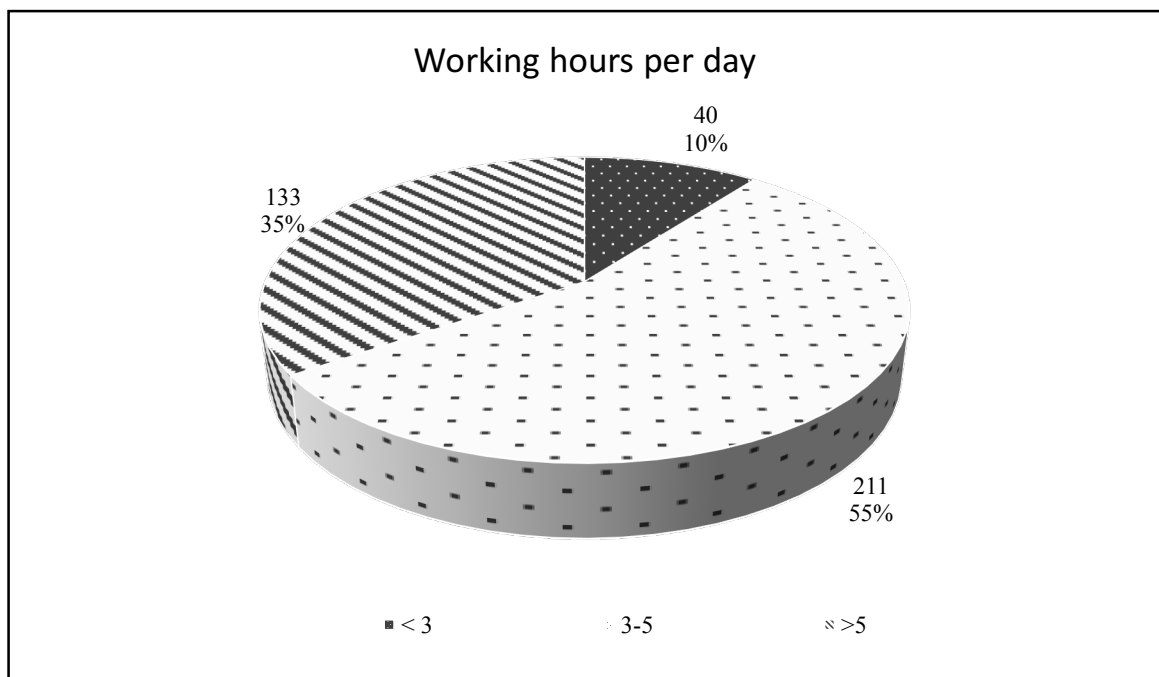


Table 11: Distribution of beedi workers according to number of beedi's rolled per day.

No. of Beedi's rolled per day	No. of Workers	Percentage
<300	56	14.6
300-500	148	38.5
501-800	129	33.6
>800	51	13.3
Total	384	100.0

Above table shows that 148 (38.5%) beedi workers out of 384 were rolling 300 to 500 beedis per day, followed by 129 (33.6%) were rolling 501 to 800 beedis per day and only 51 (13.3%) were rolling more than 800 beedis per day. Mean no of beedis rolled per day was 541.6 beedis with SD of 208.89.

Figure 11: Distribution of beedi workers according to No. of Beedis rolled per day.

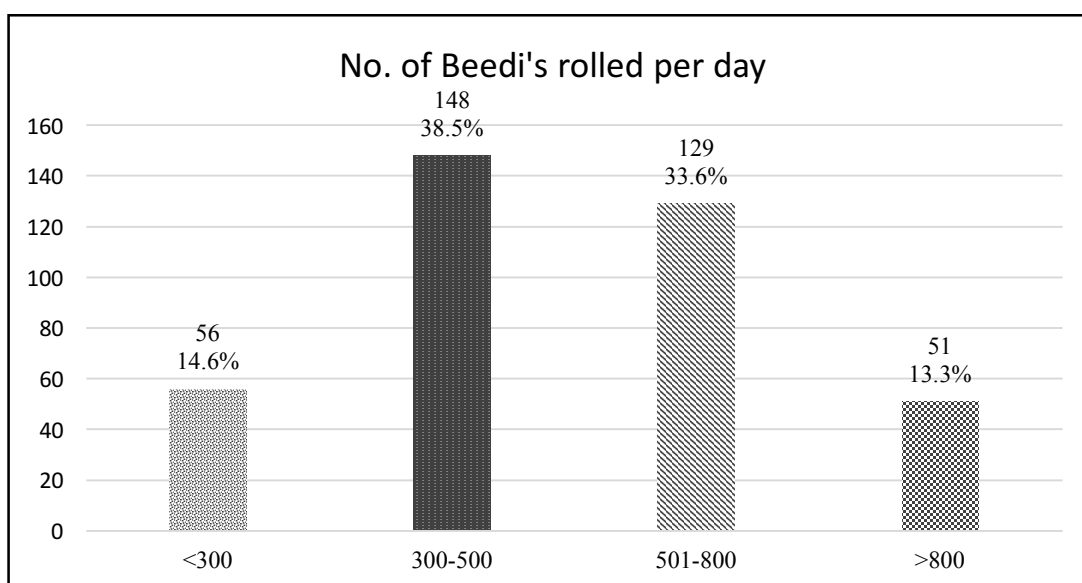


Table 12: Distribution of beedi workers according to place of work.

Place of work	No. of Workers	Percentage
Inside the house	204	53.1
Outside the house	33	8.6
Both	147	38.3
Total	384	100.0

204 (53.1%) of beedi workers preferred rolling beedi inside the house, 147 (38.3%) were rolling beedi both inside and outside the house and few 33 (8.6%) were rolling only outside the house.

Table 13: Distribution of beedi workers according to type of house.

House type	No. of Workers	Percentage
Pucca House	211	54.9
Semi pucca House	173	45.1
Katcha House	0	0
Total	384	100.0

The above table shows that 211 (54.9%) were living in pucca house and 173 (45.1%) were living in semi pucca house, and none lived in katcha house.

Figure 12: Distribution of Beedi workers according to House type.

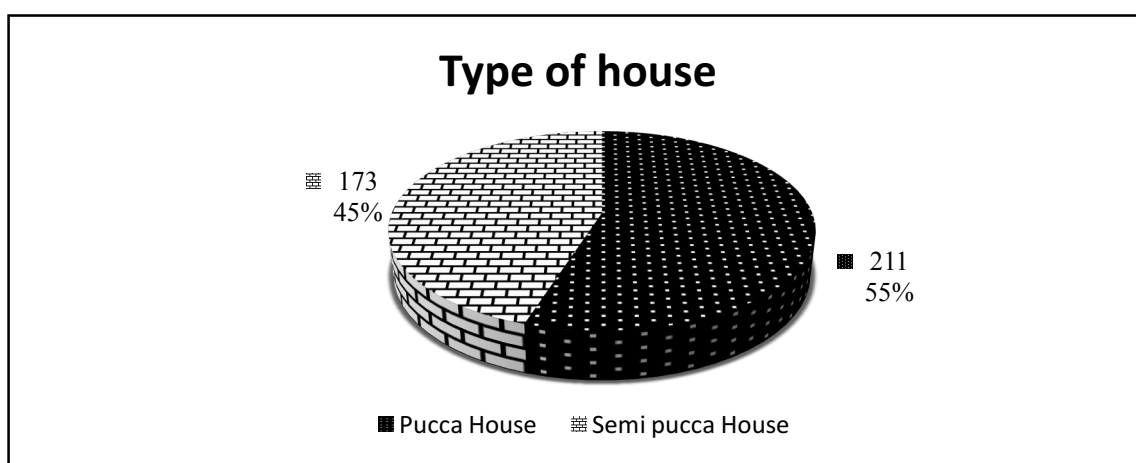


Table 14: Distribution of beedi workers according to indoor factors.

Cross Ventilation	No. of Workers	Percentage
Present	213	55.5
Absent	171	44.5
Natural lighting		
Adequate	275	71.6
Inadequate	109	28.4
Artificial lighting		
Adequate	364	94.8
Inadequate	20	5.2

The above table shows that 213 (55.5%) workers were living in houses with adequate cross ventilation ,275 (71.6%) were living in a house with adequate natural lighting and majority (94.8%) of the house artificial lighting was present and in very few (5.2%) houses it was absent.

Figure 13: Distribution of indoor factors.

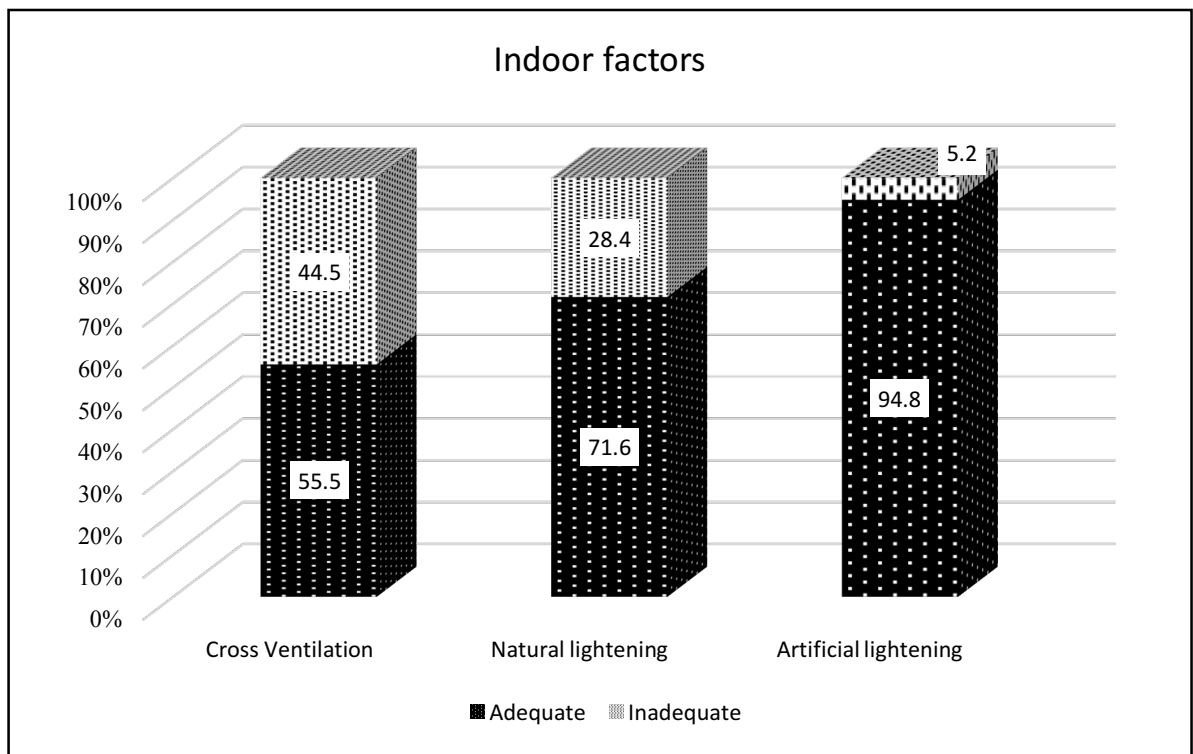


Table 15: Association between age group and tobacco consumption among beedi workers

Age In Years	Consumption of Tobacco		p Value
	Present	Absent	
	No. (%)	No.(%)	
18 - 24	1 (3.2)	30 (96.8)	0.000
25 - 34	23 (22.8)	78 (77.2)	
35 - 44	27 (24.3)	84 (77.2)	
45 - 55	54 (51.9)	50 (48.1)	
>55	15 (40.5)	22 (59.5)	
Total	120 (25.5)	264 (74.5)	

$\chi^2=39.36$, df= 4, p=0.000.

The above table shows that 120 (25.5%) of beedi workers were consuming some form of tobacco, the most commonly consumed is tobacco chewing and smoking followed by betel nut chewing.

The table shows that as the age group increases prevalence of tobacco consumption increases till 55 years. In the age group between 45 to 55 years 51.9% of subjects consumed tobacco, followed by 40.5%, 24.3 % consume tobacco in age group more than 55 years and 35-44 years respectively.

Figure 14 Distribution of tobacco usage among beedi workers. (N = 120)

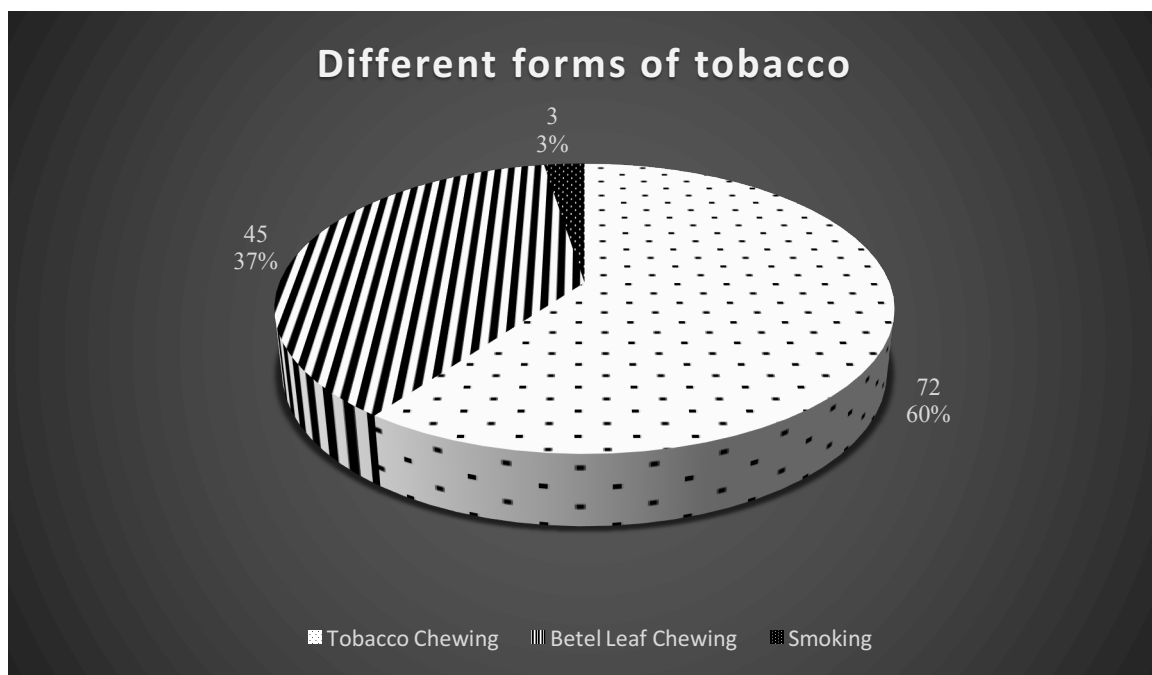


Table 16: Distribution of beedi workers according to registration for welfare schemes.

Registration in beedi welfare schemes	No. of Workers (%)
Present	166 (43.2)
Absent	218(56.8)

The above table shows that 166 (43.2%) were registered under beedi worker's welfare scheme and the rest 218 (56.8%) were not registered.

Table 17: Distribution of beedi workers according to awareness for welfare schemes.

Awareness of beedi welfare schemes	No. of Workers (%)
Present	114 (29.7)
Absent	270(70.3)

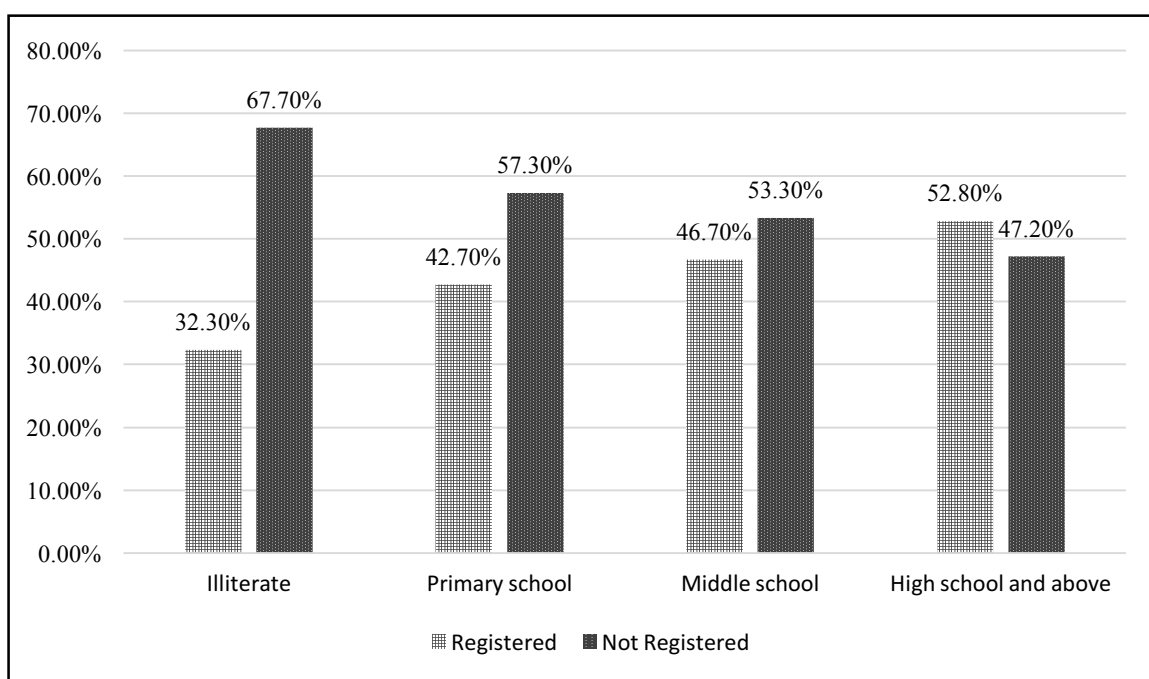
The above table shows that 105 (29.7%) were aware of welfare schemes under beedi worker's welfare fund and the rest 270 (70.3%) were not aware.

Table 18: Relationship between registration status of welfare schemes and educational level.

Educational level	Registration of Welfare Schemes		p Value
	Yes	No	
	No.(%)	No. (%)	
Illiterate	31(32.3)	65 (67.7)	.047
Primary school	41 (42.7)	55 (57.3)	
Middle school	56 (46.7)	64 (53.3)	
High school and above	38 (52.8)	34 (47.2)	
Total	166 (43.2)	218 (56.8)	

$\chi^2=7.943$, df= 3, p=0.047

Figure 15: Relationship between education level and registration status of welfare schemes



For statistical purpose educational status above the high school was clubbed as one group.

The above table shows that only 166 (43.2%) were registered under beedi worker's welfare scheme and the rest 218 (56.8%) were not registered.

The table shows that as the educational status increased the registration in beedi welfare also increased. This finding was statistically significant.

Table 19: Relationship between awareness of beedi welfare scheme educational level.

Educational level	Awareness of beedi welfare scheme		p value
	Present	Absent	
	No.(%)	No. (%)	
Illiterate	18 (18.8)	78(81.2)	0.009
Primary school	29(30.2)	67(69.8)	
Middle school	36(30)	84(70)	
High school and above	31(43.1)	41(56.9)	
Total	114(29.7)	270(70.3)	

$\chi^2=11.684$, df= 3, p=0.009.

The above table shows that only 105 (29.7%) were aware of welfare schemes under beedi worker's welfare fund and the rest 270 (70.3%) were not aware.

It is also observed that as the educational status increased the awareness in beedi welfare scheme also increased. This finding was statistically significant.

Figure 16 Relationship between educational level and awareness of beedi welfare schemes.

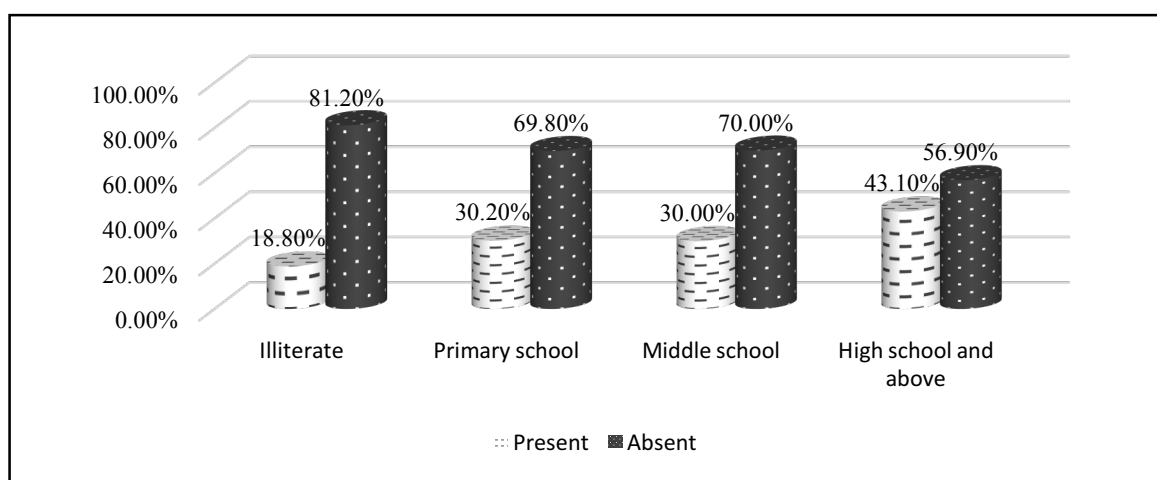


Table 20: Relationship between utilization of welfare scheme and educational status.

Educational level	Utilization of welfare schemes		p value
	Yes	No	
	No.(%)	No. (%)	0.05
Illiterate	9(29)	22(71)	
Primary school	15(36.6)	26(63.4)	
Middle school	24(42.9)	32(57.1)	
High school and above	26(68.4)	12(31.6)	
Total	74(44.6)	92(55.4)	

$\chi^2=12.903$, df= 3, p=0.05

Above table shows that 68.40% of beedi workers educated above high school utilized welfare schemes. It is also observed that as the educational status increased the utilization of beedi welfare scheme also increased. This finding was not statistically significant.

Table 21: Relationship between awareness of welfare scheme and registration of welfare scheme.

Registration welfare scheme	Awareness of welfare scheme		Total No.	P value
	Present(%)	Absent(%)		
Present	92(55.4)	74(44.6)	166	0.000
Absent	22(10.10)	196(89.9)	218	
Total	114(29.7)	270(70.3)	384	

$$\chi^2=92.768, df= 1, p=0.000$$

The above table shows that only 114 (29.70%) out of 384 subjects were aware of the welfare schemes.

It was also shows that registered beedi workers, were more aware (55.40%) of welfare benefits as compared to not registered beedi workers (10.10%). This finding was statistically highly significant.

Figure 17: Relationship between awareness of welfare Scheme and registration of welfare scheme.

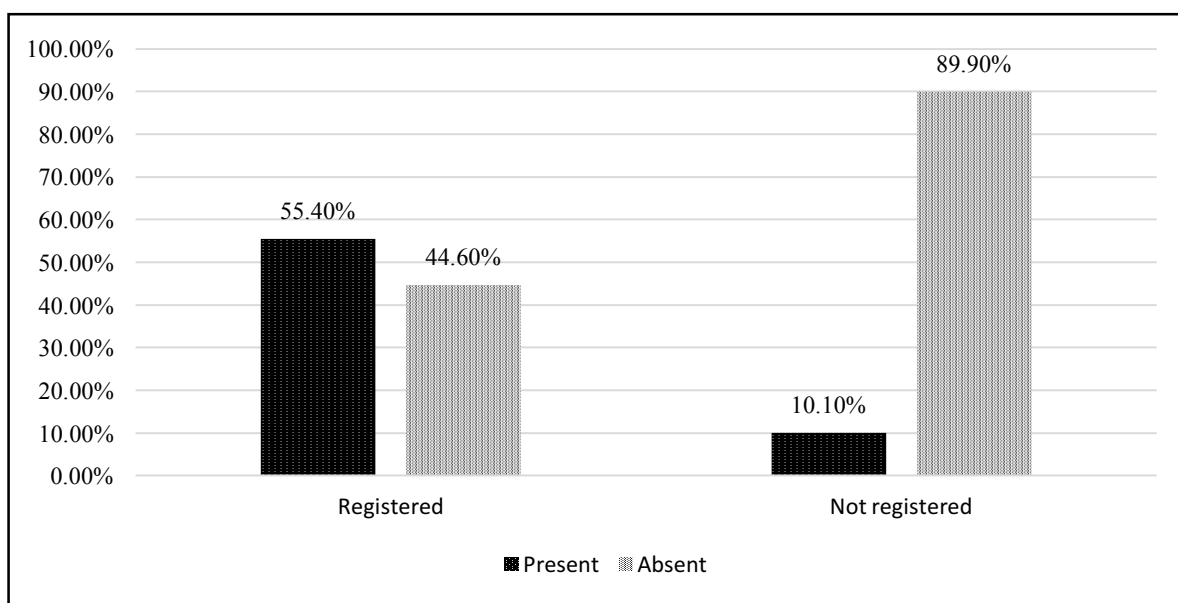


Table 22: Relationship between utilization of welfare scheme and awareness of welfare scheme.

Awareness welfare scheme	Utilization of welfare scheme		Total No.	P value
	Present(%)	Absent(%)		
Present	74(65)	40(35)	114	0.000
Absent	0(0)	52(100)	52	
Total	74(44.6)	92(55.4)	166	

$$\chi^2=54.314, df= 1, p=0.000$$

The above table shows that 114 subjects who were aware of welfare schemes, 74(65%) were utilizing and 40 (35%) were not utilizing schemes. All the subjects who were not aware were not utilizing the scheme. This finding was statistically highly significant.

Table 23: Types of morbidity of the beedi workers.

Morbidity (N=384)	No. of Workers	Percentage*
Musculoskeletal	277	72.02
Respiratory	92	23.9
Eye	46	11.9
Others	23	5.9

*Values represent row percentage out of N-384.

The above table shows that, 72% had musculoskeletal problem, 23.9% had respiratory problems, 11.9% had eye problems and 5.9% had others problems (Others include weakness, easy fatigability, dental symptoms, dermatological symptoms, gastritis, headache, menstrual problems). More than one type of morbidity was present in some beedi workers.

Figure 18: Types of morbidity of the beedi workers.

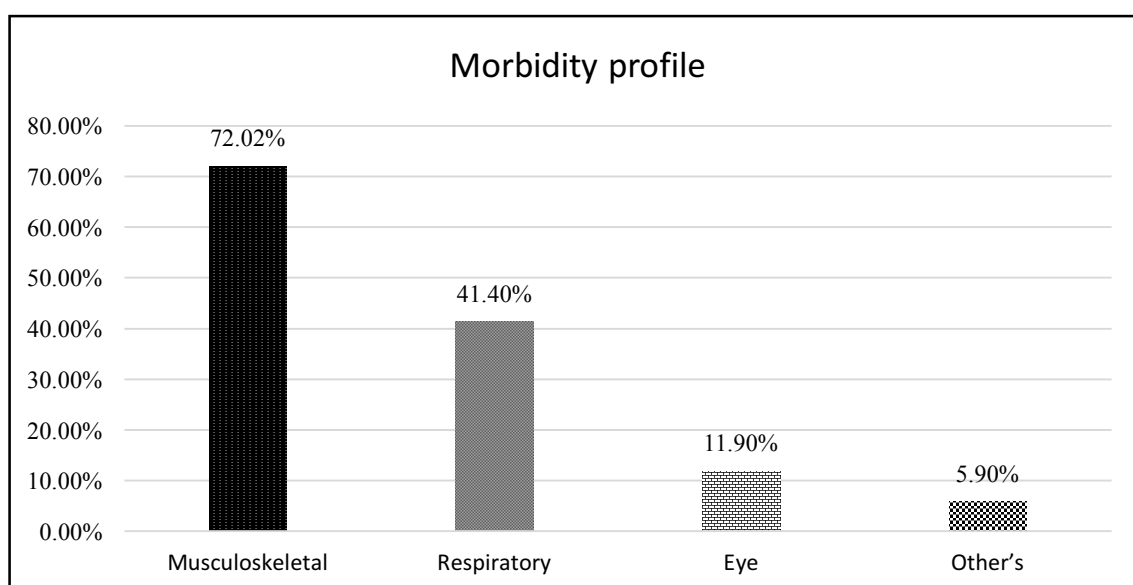


Table 24: Distribution of beedi workers as per different presentation of musculoskeletal problems.

Type of problem	No. of Workers	Percentage
Low back pain	118	30.7
Knee joint pain	105	27.3
Shoulder joint pain	50	13
Elbow joint pain	49	12.8
Ankle/feet Pain	48	12.5
Neck pain	43	11.2
Wrist joint pain	36	9.4

Most common symptom being low back pain 118(30%) followed by knee joint pain 105(27.3%), shoulder pain 50(13%), elbow joint pain 49(12.8%), ankle/feet pain 48(12.5%), neck pain 43(11.2%) and wrist joint pain 36(9.4%).

Figure 19: Distribution of beedi workers with respect to type of musculoskeletal problem.

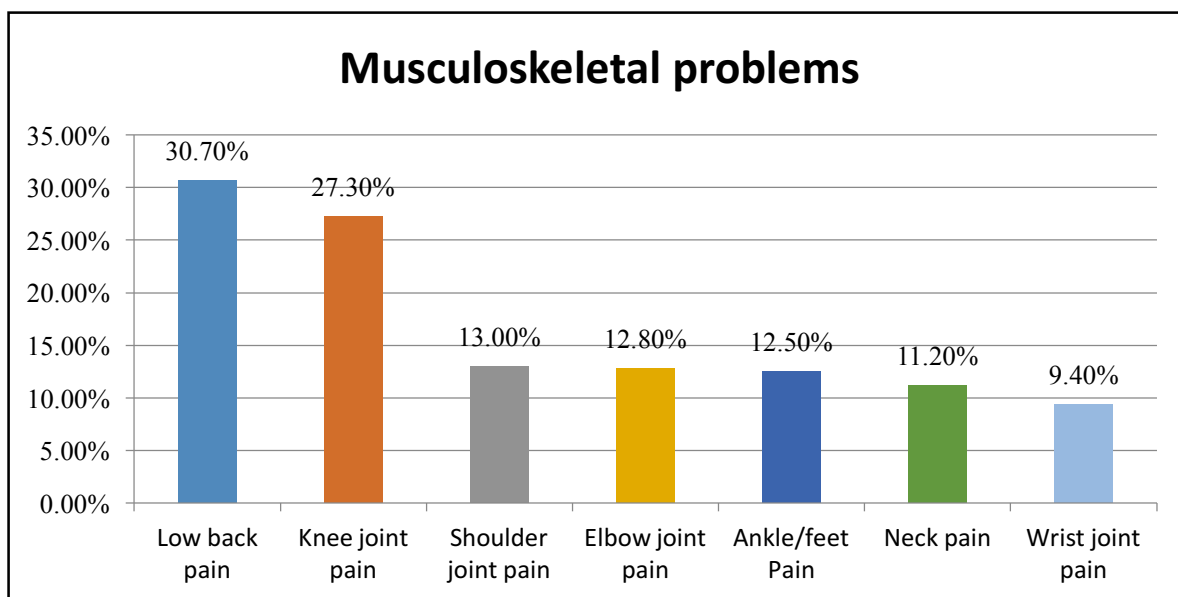


Table 25: Distribution of beedi workers with respect to no. of musculoskeletal symptom per worker.

Total No MSP	No. of Workers	Percentage
1	150	39.1
2	90	23.4
3	29	7.6
4	8	2.1
Total	277	72.02

The above table shows that musculoskeletal symptoms present in 277(72.02%) of the study group. 150 (39.1%) had any one of the musculoskeletal problems, 90 (23.4%) had two musculoskeletal problems, 29 (7.6%) had three musculoskeletal problems, 4(2.1%) four musculoskeletal problems.

Table 26: Relationship between musculoskeletal symptoms with age group of Beedi workers.

Age In Years	Musculoskeletal Problems		P value
	Present	Absent	
	No.(%)	No.(%)	
18 - 24	11(35.5)	20(64.5)	0.000
25 - 34	58(57.4)	43(43.6)	
35 - 44	73(65.8)	38(34.2)	
45 - 55	98(94.2)	6(5.8)	
>55	37(100)	0(0)	
Total	277(72.02)	107(27.98)	

$\chi^2=73.383$, df= 4, p=0.000

The above table shows that as age increases the musculoskeletal symptoms also increases. 100% of beedi workers more than 55 years were having symptoms as compared to 35.5% in 18-24-year age group. This finding was highly statistically significant.

Figure 20: Distribution of musculoskeletal problem among different age group.

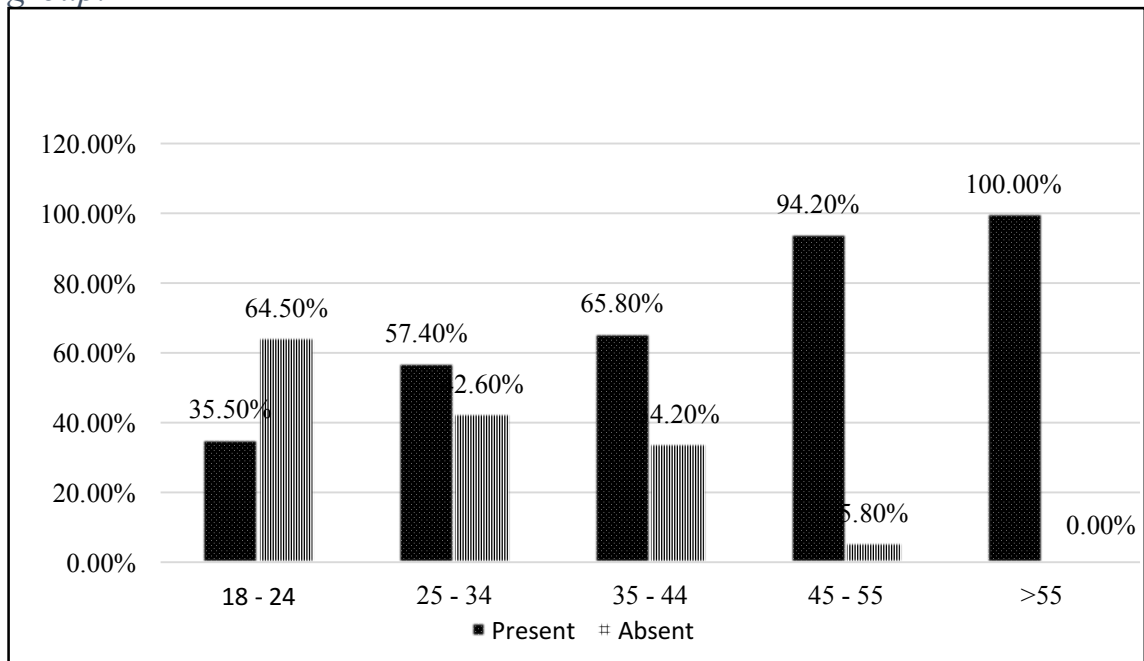
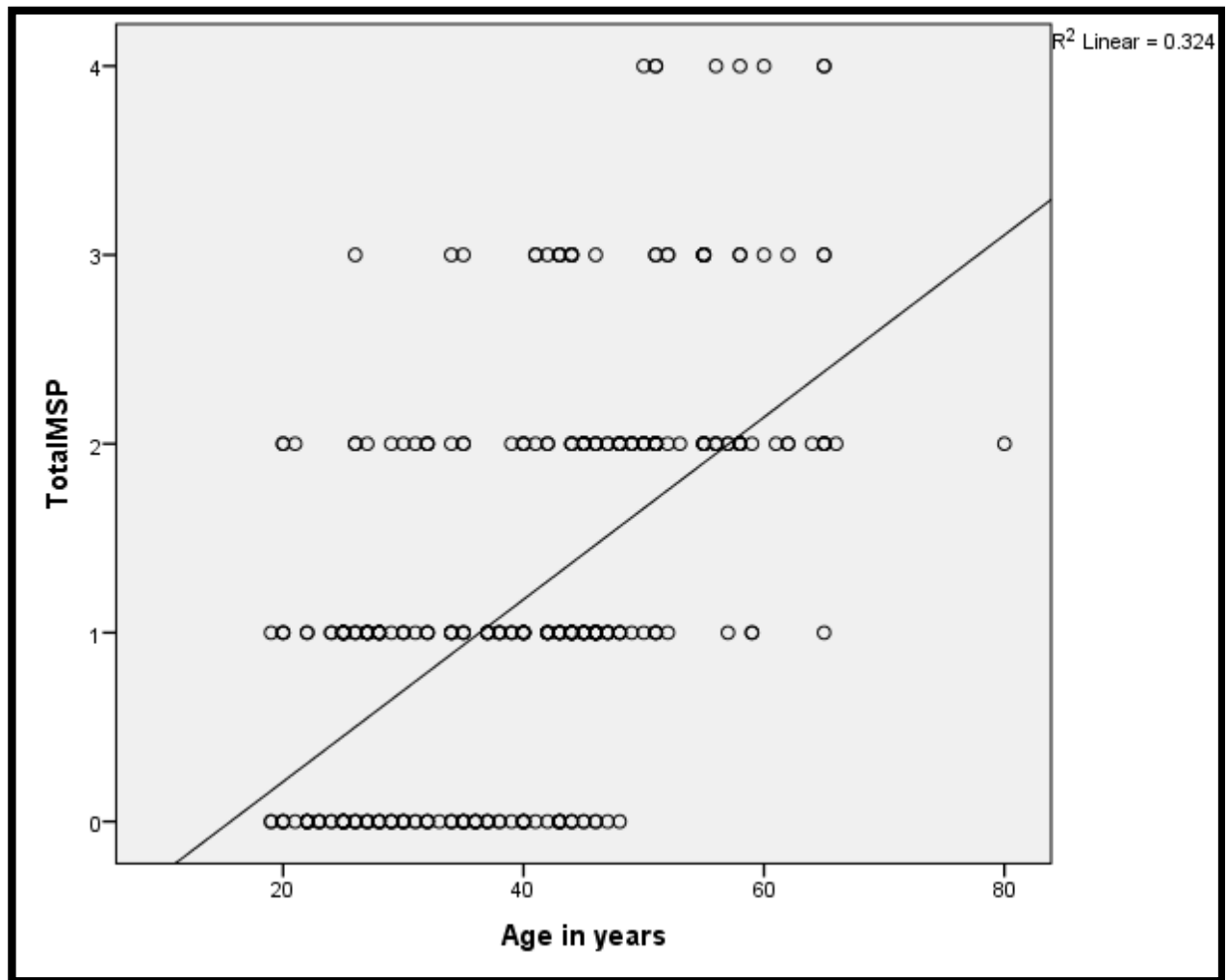


Figure 21: Correlation between musculoskeletal problem and age.



The spearman's correlation between age and musculoskeletal problems showed a positive correlation, as the age increases the musculoskeletal problems also increased with correlation coefficient 0.581 and statistically significant.

Table 27: Relationship between occupational duration and musculoskeletal problems.

Duration of job in years	Musculoskeletal Problems		P value
	Present	Absent	
	No.(%)	No. (%)	
<5	39(49.4)	40(50.6)	0.000
5-10	22(71)	9(29)	
11-15	48(71.6)	19(28.4)	
16-20	46(82.1)	10(17.9)	
>20	122(80.8)	29(19.2)	

$\chi^2 = 28.827$, df= 4, p=0.000

Above table shows that as the occupational duration increases the musculoskeletal symptom increases. 80.80 % of beedi workers with more than 25years of work duration were having musculoskeletal symptom as compared to 49.4% of subjects with less than 5years work duration. This finding was statistically highly significant.

Figure 22: Relationship between occupational duration and musculoskeletal problems.

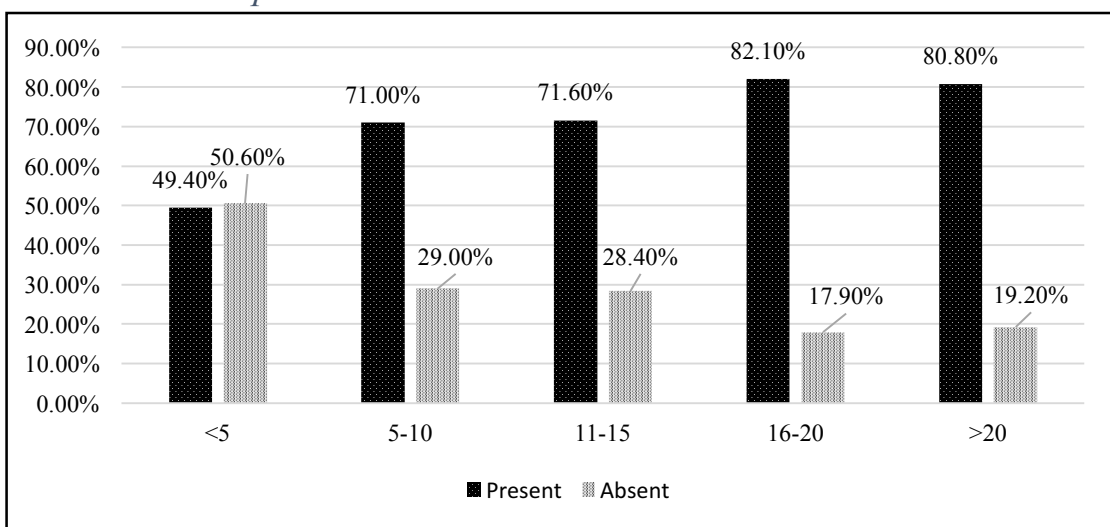
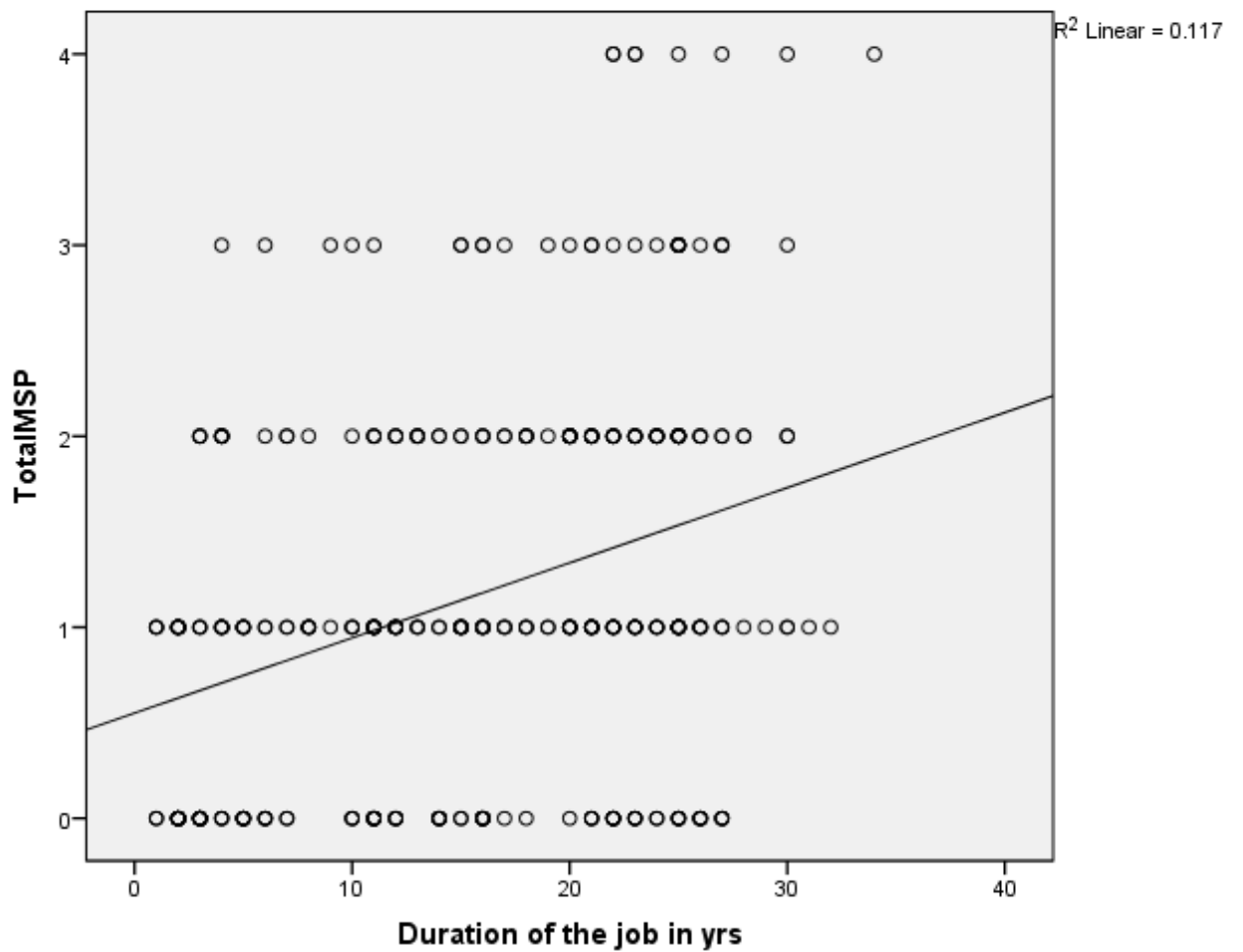


Figure 23: Correlation between musculoskeletal problem and duration of the job.



The spearman's correlation between duration of job and musculoskeletal problems showed a positive correlation, as the duration of job increases the musculoskeletal problems also increased with correlation coefficient 0.321 and statistically highly significant.

Table 28: Relationship between working patterns and musculoskeletal problems.

Working pattern		Musculoskeletal Problems		p value
		Present	Absent	
		No.(%)	No.(%)	
Working hours per day	< 3	28(70)	12(30)	.093
	3-5	144(68.2)	67(31.8)	
	>5	105(78.9)	28(21.1)	
Working days per week	< 3	13(54.1)	11(45.9)	.377
	3-5	115(73.3)	44(36.7)	
	>5	149(74.1)	52(25.9)	
No. of Beedi's rolled per day	<300	35(62.5)	21(57.5)	.437
	300-500	104(70.3)	44(29.7)	
	501-800	97(75.2)	32(24.8)	
	>800	41(80.3)	10(19.7)	

Above table shows that 70%, 68.2% and 78.9% beedi workers were having musculoskeletal symptoms who work for more than 5days, 3-5 days and less than 3 days per week respectively.

The working days per week and number beedi rolled per day is also related to musculoskeletal problem directly, however this was not statistically significant.

Table 29: Distribution of beedi workers with respect to respiratory problem.

Type of problem	No. of Workers	Percentage
Cough	86	22.40
Breathlessness	38	9.90
Wheeze	26	6.80
Others	9	2.30

Most common symptom being cough 86 (22.40%) followed by breathlessness 38(9.903%), wheeze 26(6.80%) and others include rhinitis, throat burning 9 (2.30%).

Figure 24: Distribution of beedi workers with respect to respiratory problems.

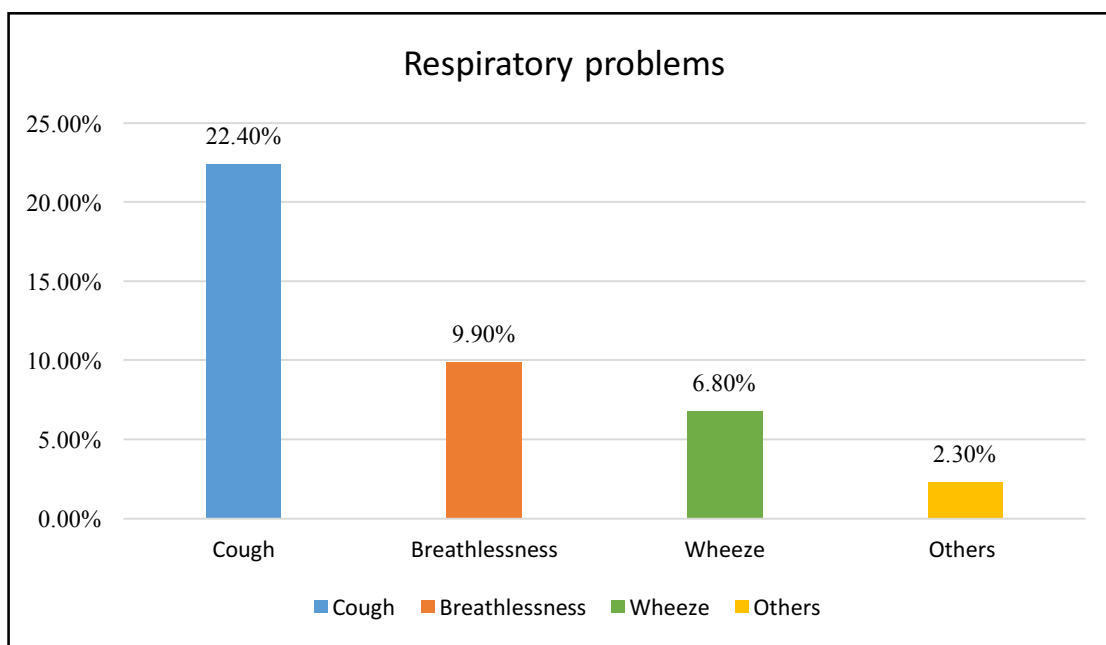


Table 30: Relationship between occupational duration and respiratory problems.

Duration of job in years	Respiratory Problems		P value
	Present	Absent	
	No. (%)	No. (%)	
<5	24 (30.4)	55 (69.6)	0.018
5-10	10 (32.3)	21 (67.7)	
11-15	23 (34.3)	44 (65.7)	
16-20	26 (46.4)	30 (53.6)	
>20	76 (50.3)	75 (49.7)	
Total	159 (41.4)	225 (58.6)	

$\chi^2=4.672$, df= 4, p=0.018

The above table shows that 159 (41.4%) were having respiratory problems. It also shows that as the work duration increases the respiratory problem increases. 76 (50.30%) of beedi workers with more than 25 years of work were having respiratory problems compared to 24 (30.40%) with less than 5 years work duration. This finding was statistically significant.

Figure 25: Relationship between occupational duration and respiratory symptoms.

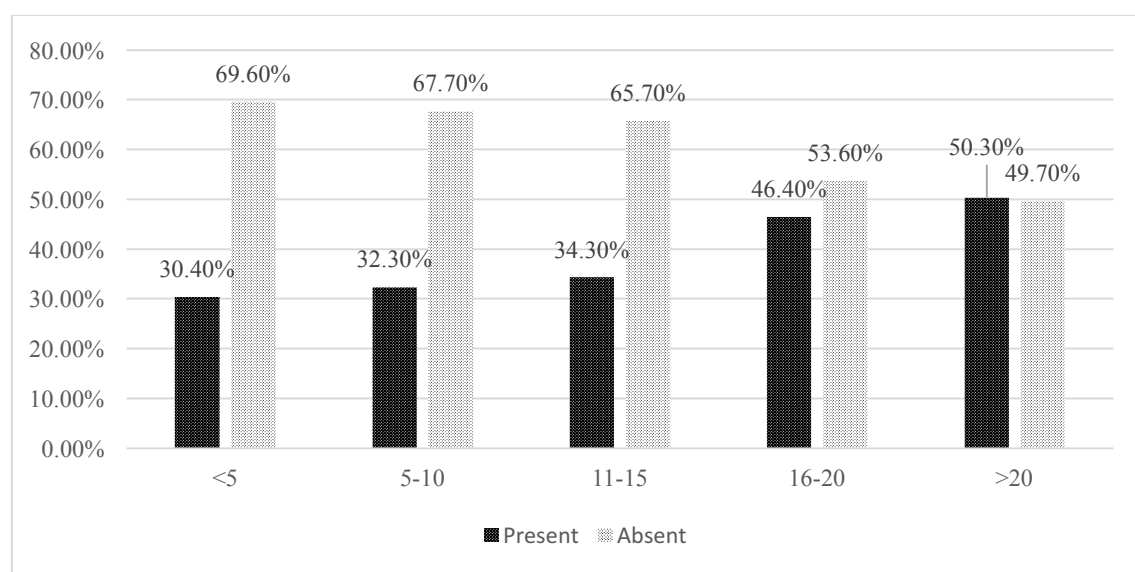


Table 31: Relationship between tobacco consumption and respiratory problems of beedi workers.

Consumption of Tobacco	Respiratory Problems				P value
	Present		Absent		
	No.	Percentage	No.	Percentage	
Yes	58	40.8	62	59.2	0.63
No	101	34.8	163	65.2	
Total	159	41.4	225	58.6	

$\chi^2=1.272$, df= 1, p=0.63

Above table shows that among those who consume tobacco 40.8% were having respiratory symptoms as compared to 34.8% among those who do not consume tobacco. However this finding was not statistically significant.

Table 32: Distribution of beedi workers according to pulmonary function.

Result of Pulmonary Function Test	No. of Workers	Percentage
Obstructive	8	9.6
Restrictive	2	2.4
Mixed	3	3.6
Normal	70	84.3
Total	83	100.0

Above table shows that out of 83 subjects on whom spirometry was performed, 8(9.6%), 2(2.4%), 3(3.6%) and 70(84.3%) were having obstructive, restrictive, mixed restrictive and obstructive and normal spirometry findings respectively.

Figure 26: Results of pulmonary function test.

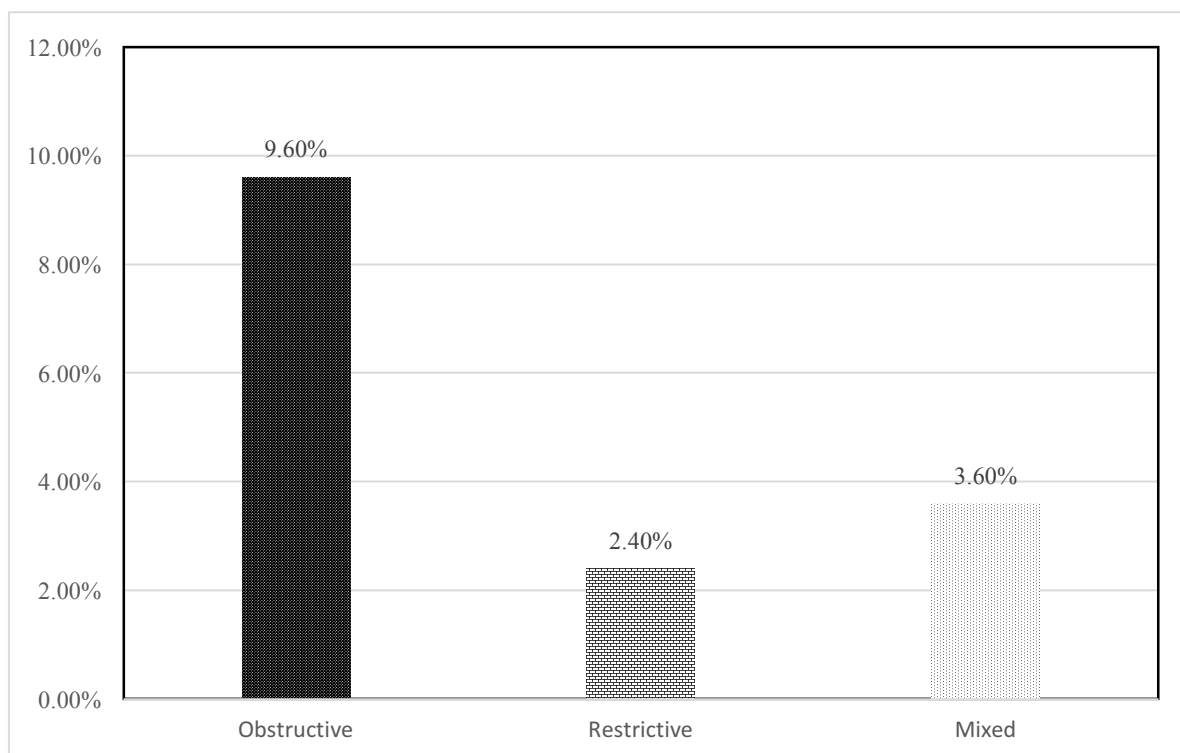


Table 33: Relationship between respiratory problems and pulmonary function test in sub sample of study population.

Respiratory Problem	No. of Workers	Percentage
Present	50	60.2
Absent	33	39.8
Total	83	100.0

Respiratory Problem	FVC	FEV1	PEFR	FEV1/FVC
	Mean±SD	Mean±SD	Mean±SD	Mean±SD
Present	2.91±0.83	2.45±0.72	4.20±1.44	85±14
Absent	2.66±0.74	2.39±0.55	4.66±1.12	92±10

Above table shows that 60.2% of the subjects and some form of respiratory problems. The mean values were higher among those with respiratory symptom.

Table 34: Hand washing practice among beedi workers.

Hand washing practice	No. of Workers	Percentage
Yes	63	16.4
No	321	83.6
Total	384	100.0

Form the above table shows that 83.6% were not washing their hands after work.

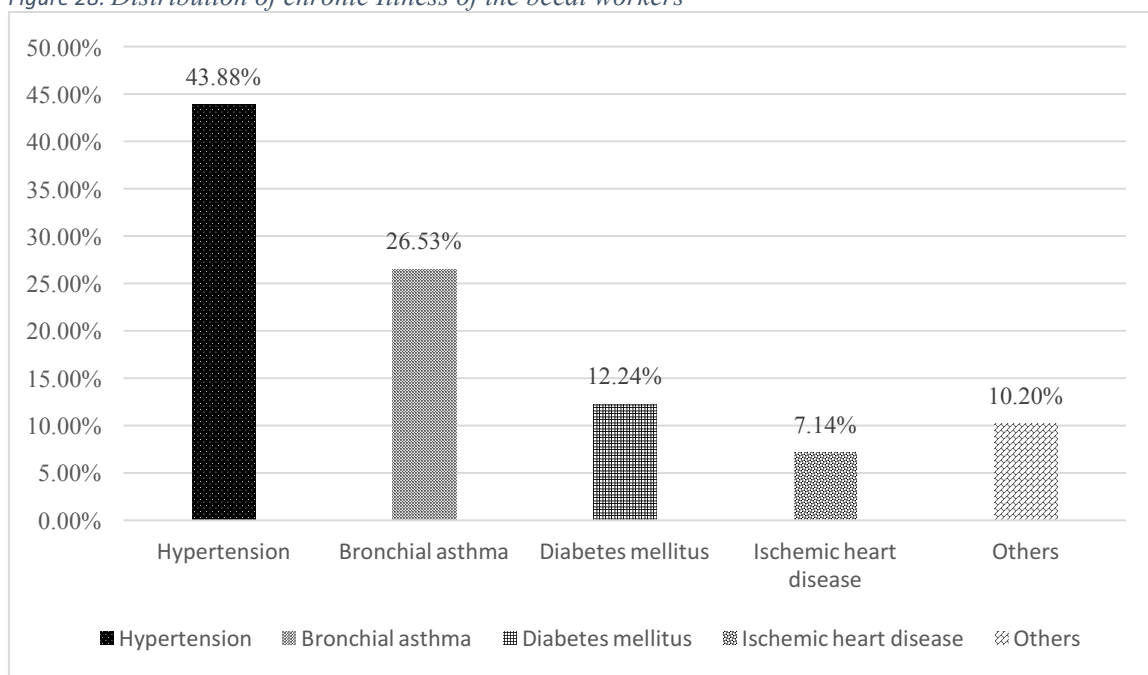
Figure 27: Hand washing practice among beedi workers.



Table 35: Distribution of chronic Illness of the beedi workers

Chronic illness	No. of Workers	Percentage
Hypertension	43	43.88
Bronchial asthma	26	26.53
Diabetes mellitus	12	12.24
Ischemic heart disease	7	7.14
Others	10	10.20

Figure 28: Distribution of chronic Illness of the beedi workers



The above table shows chronic illness was present in 98 (25.5%) beedi workers out of 384 subjects. Most common illness being Hypertension in 43(43.8%) subjects followed by Asthma 26(26.5%), Diabetes Mellitus 12(12.24%), Ischemic Heart Disease 7 (7.14%) and others 10(10.2%) like goitre and cancer. More than one type of illness was present in some beedi workers.

DISCUSSION

SOCIO DEMOGRAPHIC DETAILS

The mean age of the study subjects was 39.86 years with standard deviation of 11.66. whereas Ghosh P C et al, in 2005 reported that mean age was 45.9 years with a standard deviation 12.66.⁴² More than 90% of the study subjects were female beedi workers. Study done by Rajasekhar et al, in 2001 in Dakshina Kannada district reported that over 93% of beedi workers were females.⁴³ Rajasekhar et al, in 2002 reported that most of the beedi rolling was done by females.³⁵ which is supported by various other studies.^{11,44,45}

Sudharshan et al, in 1999 reported that women constituted the bulk of beedi workers and employers and their contractors find this arrangement convenient because they could avoid both a) Reporting workers to the government and b) Providing legally required benefits.⁴⁶

In our study, 25% were illiterates whereas study done by T R Selvan et al,⁴⁷ and Anil M et al,⁴⁸ reported 15% and 19% respectively. Madhusudan et al,¹¹ reported 22% illiterates on the same lines of 25% as in our study. According to the report from the beedi sector programme designed by ILO, for women beedi workers at Dakshina Kannada district, most of the beedi workers are home based and are either semi-literate or illiterate. Therefore they are not

able to access the benefits.⁴⁹

In our study 214(55.7%) belonged to class IV, 150(39.1%) to class V according to modified BG Prasad classification. While Sabale RV et al reported 42.31 and 25% belonged to class IV and class III respectively.²⁹ Majority of the respondents (63.3 percent) had involved in this job due to poverty.⁴⁵

77% of the beedi workers were married in our study. Madhusudan et al¹¹ and Anil M et al⁴⁸ reported that 75% and 78% were married respectively as per their study. Study done by Vidhubala et al⁵⁰, reported that, 23.5% were unmarried, where as in our study it is 3.4%.

WORKING PLACE AND DURATION OF SERVICE OF BEEDI WORKERS

Our study shows that 53.9% of study subjects were working for more than 15 years. Mean duration of work was 15.7 years with a SD of 8.57. According to the report from the beedi sector programme designed by ILO majority of women beedi workers have been rolling beedis for more than 15 years.⁴⁹ Similar findings were noted in studies done by Rajasekhar et al³⁵, Madhusudan et al¹¹ and Sudharshan et al⁴⁶.

In our study 53% were working inside the house and 38.3% were working both inside and outside the house. whereas studies done by Anil M et al reported that 77% were rolling inside the house.⁴⁸ According to the report from the beedi sector programme designed by ILO, did not have separate room for rolling.⁴⁹ Study done by Rajasekhar et al³⁵, showed that all the subjects undertook beedi work at home and over 90% of them did not have separate room for the work.

Since the work is interspersed between household/domestic chores, it is often difficult to count the hours of work strictly devoted to beedi making. However, the pressure to fulfil targets being high, women often make adjustments with their time for food, sleep, rest, entertainment and social obligations, which make them at risk of health problems.⁵⁵

HABITS OF BEEDI WORKERS

Study done by Koli PP reported that, workers were consuming tobacco in the form of chewing tobacco and tobacco snuff.⁵¹ Present study also shows that among those who consume tobacco, majority (60%) of them were using smokeless tobacco, and only 3% were smoking. As majority of the study subjects are female beedi workers, smokeless form of tobacco consumption is more prevalent. The beedi workers are already exposed to tobacco dust at

their work environment and tobacco snuff being most common form of tobacco consumed, these beedi workers are at higher risk for respiratory problems.

REGISTRATION STATUS OF BEEDI WORKERS

Possession of a pass book/identity card is an important criterion for beedi worker to get eligibility for utilizing the welfare schemes available for beedi workers.

In 2009, The Ministry of Labour and Employment in Karnataka had identified 4,08,418 beedi workers, whereas the pass book / identity card had been issued to only 2,44,146 beedi workers.⁵² But the present study showed that 56% of subjects were registered as evidenced by the identity card. Also study done by ILO showed that only 50% had identity cards.⁵³ A study by Rajasekhar et al³⁵ was also found that only 44.4% out of 876 respondents had identity cards.⁵⁴ This finding is also supported by other studies done by Rajasekhar et al⁴³ and Ghosh et al.¹ According to the trade unions working for beedi workers in Karnataka, two-thirds of the total workers roll beedis for unregistered companies and these workers do not have any identity cards.

MORBIDITY PROFILE OF BEEDI WORKERS

Musculoskeletal problems

Musculoskeletal problems was commonest problem (72%) identified in our study. Studies done by Meena Gopal et al,³³ Vinod Sen et al,¹⁰ and Yasmin et al,⁵⁵ reported that 65%, 67 and 75% had musculoskeletal problem respectively.

In our study most common symptom was low back pain 118 (30%) followed by knee joint pain 105(27.3%), shoulder pain 50(13%), elbow joint pain 49(12.8%), ankle/feet pain 48(12.5), neck pain 43(11.2%) and wrist joint pain 36(9.4%). Where as, Rajasekhar et al,³⁵ and Vinod Sen et al,¹⁰ reported 25% and 51.43% with back pain respectively. In contrast to our study, Ghosh et al⁴² reported 79.7% workers with back pain.

Study done by Ghosh et al,⁴² reported that among beedi workers the musculoskeletal symptoms are, shoulder pain 79.6%, neck pain 71.3%, knee pain 49%, elbow pain 30.6%, wrist pain 34.8%.The nature of work which involves prolonged sitting with bending of the trunk, the excessive use of fingers and the constant high tension levels to meet targets were identified as the cause for number of health problems. The sitting posture leads to a static contraction of back muscle, resulting in head, neck, leg and back aches as there is no body movement.

Respiratory problems

Our study showed that 23.9% had respiratory problems. Study done by Shahla Yasmin et al, reported 50% had respiratory problems.⁵⁵ Study done by Rajasekhar et al, showed that the common respiratory problems faced by beedi workers was asthma (6.3%).⁴³ Study done by Vinod Sen, reported 11.13% of asthma.¹⁰ Study done by Meena Gopal reported that 9.7% cough.³³ Voluntary Health Association of India (VHAI) has reported that 75% of the beedi workers in the country suffer from multiple illnesses due to continuous exposure to tobacco and other hazardous substances. The workers spent at least 12 hours rolling beedi's and faced the risks of contracting TB and developing chronic bronchitis and asthma.³⁴ Study done by Aghi M B, reported that initially tobacco dust inhalation makes beedi workers feel giddy and over the long term many develop chronic bronchitis, asthma and even tuberculosis.²¹

Inhaling tobacco dust for longer duration makes beedi workers more prone to develop respiratory problems. Similar findings has been reported in various other studies done by Rajasekhar et al,³⁵ Ghosh et al,⁴² and Vinod Sen.¹⁰

In the present study 9.6%, 2.4%, 3.6% and 84.3% were having obstructive, restrictive, mixed restrictive and obstructive and normal spirometry findings respectively. Study done by Chattopadhyay et al, showed that there was a

gradual decline of lung volume in exposed subjects as the duration of exposure increased. Respiratory impairments like restrictive, obstructive and combined restrictive and obstructive type among exposed workers as off whole were much higher (23.53%) compared to the control(3.56%).³²

Study done by Chattopadhyay et al, to assess the respiratory response to tobacco dust among beedi binders showed that PFT (Pulmonary Function Test) values gradually reduced as the duration of exposure increased in beedi workers and as a whole 25.7% male and 11.2% female beedi binders had respiratory impairment. The pulmonary function impairments are of restrictive (7.34%), obstructive (11%) and combined (restrictive and obstructive) 7.34%. Among the females the corresponding values were 3.37% and 7.87%.⁵⁶

Other problems

Present study showed 11.9% had eye problems and 5.9% had others problems. Study done by Rajasekhar et al,³⁵ showed eye problems (6.3%) and headache (3%).⁴³ Study done by Meena Gopal reported 8.9% giddiness and 8.4% stomach related problems.³³ Study done by Vinod Sen, reported 44.3% cold and allergy, 20% constitute eye problems, and 11.13% asthma.¹⁰ Study done by Shahla Yasmin et al, reported that more than 70% had eye, gastrointestinal and nervous problems.⁵⁵

SUMMARY AND CONCLUSION

A cross sectional study was done among beedi workers in Kolar city, to study the health problems among beedi workers. The study included 384 of beedi workers. A pretested, semi-structured questionnaire was used to collect data regarding socio demographic profile, personal habits, housing condition, work pattern and morbidity pattern. Spirometry was performed on 20% of study subjects to assess the pulmonary function. Statistical analysis was performed using SPSS version 22.

The study included 371(96.6%) females and 13(3.4%) males. 147(34%) were educated up to middle class, 96 (25%) subjects were illiterates. While 214 (55.7%) belonged to class IV modified B Prasad.

151 (39%) were working for more than 20 years and only 79 (20.6%) of them working for less than 5 years. 204 (53%) subjects were working inside the house while 147 (38%) were working both inside and outside the house. 120 (25.5%) of study subjects were consuming some form of tobacco.

166 (43.2%) were registered under beedi welfare association, while only 114 (29.70%) were aware of welfare schemes and only 74 (44%) among

those registered were utilizing the welfare benefits. Education played no role in awareness and utilization of welfare schemes.

The most common health problem was musculoskeletal problem 277 (72.02%), followed by respiratory problems and eye problems. Among the musculoskeletal problem, most common was low backache followed by knee joint pain, shoulder joint pain and elbow joint pain.

The commonest chronic illness was Hypertension among 43(43.88%) followed by Asthma, Diabetes Mellitus and Ischemic Heart Disease.

Spirometry on sub sample performed showed 9.6% were having obstructive features, followed by restrictive features, mixed while 70 84.3% had normal lung function.

Conclusion

The study comprehensively showed that musculoskeletal problem were the most common morbidities among beedi workers involved in the beedi rolling activity, which was related to the number of years of service and the working posture of continuous forward bending at the trunk.

There was also lack of awareness about welfare schemes as a result of which both registration and utilization was less among beedi workers. Education plays a important role in creating awareness and utilization of welfare schemes and this stresses the importance of imparting awareness regarding the preventive and promotional measures to the workers.

RECOMMENDATION

Based on the findings of the study, considering the health problems of the beedi workers, we would like to recommend the following for promoting better health among the workers.

- Increase the awareness on welfare schemes and safety practices.
- There should be a fool-proof registration system and ID cards provided to all workers and contractors so that the benefits can reach them.
- Periodical health check ups may be conducted by the government or NGO as the beedi workers are more prone to health hazards.
- Interventions are required to minimize tobacco exposure on effected person by proving an alternate job.

LIMITATION

- Beedi workers are constantly exposed to tobacco dust which increases the risk of respiratory problems. Spirometry is an important investigation to confirm the respiratory morbidity. Spirometry was done on only 20% of the study subjects due to constraints of time and logistics, as it was one-person investigation.
- Beedi workers suffer from various kind of ocular symptoms commonly defective vision, dull- aching headache and eye irritation with a prevalence of 31% for eye problems. Eye problem could not included in the study as it is difficult to assess them without assistance of specialist.
- It is well documented in previous studies that beedi workers, work in a poor environmental condition like tobacco dust in the house, inadequate lighting and ventilation. These factor couldn't not be assessed objectively.

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ANNEXURE I

SECTION -I Socio demographic Profile

House hold Number.....

1	Name of beedi worker:		
2	Address:		
3	Age:	Gender: M / F	Marital status: Married / Unmarried / Separated / Divorced / Widower / Widow
4	Education:		Type of family: ☐ Nuclear family ☐ Joint family ☐ Three generation
5	Occupation:		
6	Total Income of family:		Other source of income:
7	Total members in the family : Total earning members in family:		Per capita income:
No.	QUESTION	CODING CATEGORIES	CODE
8	What is the religion of the beedi worker?	Hindu	1
		Muslim	2
		Christian	3
		Other	77
		Specify(_____)	
9	What is the caste of the beedi worker?	SC	1
		ST	2
		OBC	3
		General	4
		Others specify(_____)	77
10	Does the beedi worker have a ration card?	Yes (Card Shown)	1
		Yes (Card Not Shown)	2
		ABL	3
		BPL	4
11	Modified BG Prasad classification.	Upper (I)	01
		Upper Middle (II)	02
		Middle/Lower middle (III)	03
		Upper lower (IV)	04
		Lower (V)	05

Section 2: working condition

No	QUESTION		CODING CATEGORIES	CODE
12	House type		Pucca	1
			Semi Pucca	2
			Katcha	3
13	Cross Ventilation		YES	1
			NO	2
14	Lighting	Sunlight	Adequate	1
			Inadequate	2
		Artificial Lighting	Present	1
			Absent	2
		If Artificial Lighting present	Adequate	1
			Inadequate	2
15	Where do you dispose household solid waste?		Open disposal	1
			Public dustbin	2
			others	77
16	Place of work?		Inside the house	1
			Out side house	2
			others	77
17	Since how many years you have been in this job?			
18	On average how many hours do you roll Beedi per day?			
19	On an average how many days do you roll beedi in a week?			
20	On an average how many beedi do you roll in a day			
21	Type of habits		Tobacco chewing	
			Betel leaf and nut	
			Smoking tobacco	
22	Are you doing any other job other than Beedi rolling?		YES	1
			NO	2
	If YES, Specify()			
	Duration			
23	Are you registered under beedi welfare association?		YES	01
			NO	02
24	If NO reason Specify()			
25	Are you know the welfare schemes available for registered Beedi worker?		YES	1
			NO	2
	If YES, Specify welfare schemes being utilized		YES	1
			NO	2
	If NO, reason			
25	Hand washing practice after beedi rolling?		YES	1
			NO	2

SECTION 3: HEALTH PROBLEMS

History of chronic illness

Diabetes/High B P/C H D/Asthma/Cancer/Convulsion/T B

Duration.....

I. Respiratory Problem

Symptoms

- ☐ Chronic cough
- ☐ Breathlessness
- ☐ wheeze
- ☐ Throat burning
- ☐ Others (specify).....

Investigation

Pulmonary Function Test

1. Forced Vital Capacity (FVC).....
2. Forced Expiratory Volume in 1st second (FEV₁).....
3. Peak Expiratory Flow Rate.....
4. FEV₁/FVC.....

Results

- ☐ Obstructive
- ☐ Restrictive
- ☐ Mixed

II. Musculoskeletal Problem

III. Other Problem

- ☐ Abdomen pain
- ☐ Skin diseases
- ☐ Others Specify

Trouble with locomotive organs			
Have you at any time during the last 12 months had trouble (ache, pain, Discomfort) in	To be answered only by those who have had trouble		
	Have you at any time during the last 12 months been prevented from doing your normal work (at home or away from home) because of the trouble?	Have you had trouble at any time during the last 7 days?	
Neck 1 No 2 Yes	1 No 2 Yes	1 No 2 Yes	
Shoulder 1 No 2 Yes, in the right shoulder 3 Yes, in the left shoulder 4 Yes, in both shoulder	1 No 2 Yes	1 No 2 Yes	
Elbow 1 No 2 Yes, in right elbow 3 Yes, in left elbow 4 Yes, in both elbow	1 No 2 Yes	1 No 2 Yes	
Wrist/hands 1 No 2 Yes, in the right wrist/hand 3 Yes, in the left wrist/hand 4 Yes, in both wrist/hand	1 No 2 Yes	1 No 2 Yes	
Upper back 1 No 2 Yes	1 No 2 Yes	1 No 2 Yes	
Low back (small of the back) 1 No 2 Yes	1 No 2 Yes	1 No 2 Yes	
One of both hips/thighs 1 No 2 Yes	1 No 2 Yes	1 No 2 Yes	
One of both knees 1 No 2 Yes	1 No 2 Yes	1 No 2 Yes	
One of both ankle/feet 1 no 2 Yes	1 No 2 Yes	1 No 2 Yes	

ANNEXURE II

CONSENT FORM

There is no compulsion to participate in this study. You are required to sign only if you voluntarily agree to participate in this study. You do not have to answer any questions that you do not want to answer. Further, you are at a liberty to withdraw from the study at any time, if you wish to do so. It is up to you to decide whether to participate. This document will be stored in the safe locker in the department of Community Medicine in the college and a copy is given to you for information.

RESPONDENT'S INFORMED CONSENT

I, understand that I remain free to withdraw from this study at any time. I have been read out/ explained in my local language i.e. in _____ and understand the purpose of this study and the confidential nature of the information that will be collected and disclosed during the study. I had the opportunity to ask questions regarding the various aspects of this study and my questions have been answered to my satisfaction. I agree to participate in the survey, to undergo clinical examination, pulmonary function test and authorize the collection and disclosure of my personal information as outlined in this consent form.

Signature/ Left Thumb Impression of the Respondent with date	Signature of interviewer certifying that informed consent has been given verbally by the respondent
Witness	1
	2
Principal Investigator	Signature

ANNEXURE III

INFORMATION SHEET

Introduction – My name is **Dr Harish S**, post graduate in the department of Community Medicine, Sri Devaraj Urs Medical College, Kolar. I am are carrying out a study on occupational health profile on beedi workers. The study has been reviewed by the local ethical review board and started only after their formal approval.

Most of the beedi making is mainly carried by contractual, home based daily base system where women and children are involved in this work easily. Beedi rolling causes serious occupational health problems to the workers and their family who are constantly exposed to tobacco dust and hazardous chemicals. Respiratory, ocular and musculoskeletal problems have been identified among beedi rollers. In this regard, I would interview you with some questions about your occupation. Your honest answer to these questions will help us understand better the health status of this occupation. We would greatly appreciate your help in responding to this survey. The survey will take about half an hour to ask the questions

All the information collected from you will be strictly confidential and will not be disclosed to any outsider unless compelled by law. This information collected will be used only for research.

The study involves collecting socio demographic information along with clinical examination and pulmonary function test.

ಮಾಹಿತಿಯುಕ್ತ ಸಮೈತಿಯ ನಮೂನೆ ಮತ್ತು ಪೂರೈಕೆ

ಗುರುತಿನ ವಿವರ

ರಾಜ್ಯ: ಕರ್ನಾಟಕ			
ಜಿಲ್ಲೆ: ಕೋಲಾರ			
ತಾಲ್ಲೂಕು/ವಿಭಾಗ/ಆರಕ್ಷಕತಾಣ:			
ಹಳ್ಳಿಯ ಹೆಸರು:			
ಮನೆ ಸಂಖ್ಯೆ:	 		
ಮನೆಯ ಯಜಮಾನರ ಹೆಸರು:			
ವಿಳಾಸ: _____ _____ _____ _____			
ಮಾಹಿತಿಗಾರರ ಹೆಸರು: _____			
ಮಾಹಿತಿ ಪಡೆಯುತ್ತಿರುವವರ ಹೆಸರು: ಡಾ ಹರೀಶ್.ಎಸ್			
ಭೇಟಿಯ ತಾರೀಖು:	/ /		
ಭೇಟಿಯ ಸಮಯ :	/		
	ಹೆಸರು	ತಾರೀಖು	ಸಹಿ
ಕ್ಷೇತ್ರ ಮೇಲ್ವಿಚಾರಕರ ವಿವರ			
ಸೂಕ್ಷ್ಮ ಪರಿಶೀಲನೆ ನಡೆಸುವವರ ವಿವರ			
ಮಾಹಿತಿಯನ್ನು ನಮೂದಿಸುವವರ ವಿವರ			
ಭೇಟಿಯ ಫಲಿತಾಂಶ	ಸಂದರ್ಶನ ಪೂರ್ಣಗೊಂಡಿತು	1	
	ಸಂದರ್ಶನ ಭಾಗಶಃ ಪೂರ್ಣಗೊಂಡಿತು	2	
	ಸಂದರ್ಶನ ಪೂರ್ಣಗೊಳಿಸಿಲ್ಲ	3	

ಗೌಪ್ಯತೆ ಮತ್ತು ಸಮ್ಮತಿಯ ಪತ್ರ

ತನಿಖೆದಾರರ ಹೇಳಿಕೆ :

ಪರಿಚಯ: ನನ್ನ ಹೆಸರು ಡಾ|| ಹರೀಶ್.ಎನ್ ನಾನು ಶ್ರೀ ದೇವರಾಜ್ ಅರಸ್ ವೈದ್ಯಕೀಯ ಕಾಲೇಜಿನ ಸಮುದಾಯ ವೈದ್ಯಶಾಸ್ತ್ರ ವಿಭಾಗದಲ್ಲಿ ಉನ್ನತ ವಿದ್ಯಾಭ್ಯಾಸ ಮಾಡುತ್ತಿರುವ ವಿದ್ಯಾರ್ಥಿ. ನಾನು “ಬೀಡಿ ಕೆಲಸಗಾರರ ವೃತ್ತಿಗೆ ಸಂಬಂಧಿಸಿದ ಆರೋಗ್ಯ ಮಾಹಿತಿ ಎಂಬ ಖಾಯಿಲೆಯ ಬಗ್ಗೆ ಅಧ್ಯಯನ ಮಾಡುತ್ತಿದ್ದೇನೆ. ಈ ಅಧ್ಯಯನಕ್ಕೆ ಕಾಲೇಜಿನ ನೈತಿಕ ಸಮಿತಿಯ ವತಿಯಿಂದ ಮನ್ನಣೆ ದೊರೆತಿರುತ್ತದೆ.

ಅಧ್ಯಯನಕ್ಕೆ ಸಮ್ಮತಿ ಪತ್ರ : ಬೀಡಿ ತಯಾರಿಕೆಯು ಒಪ್ಪಂದದ ಮೇಲೆ ಮನೆಯಲ್ಲೇ ಪ್ರತಿದಿನವೂ ಮಕ್ಕಳು ಹಾಗೂ ಹೆಂಗಸರನ್ನು ಸುಲಭವಾಗಿ ಈ ಕೆಲಸದಲ್ಲಿ ತೊಡಗಿಸಿಕೊಂಡಿರುತ್ತಾರೆ. ಬೀಡಿ ತಯಾರಿಕೆಯ ಕಾರ್ಯದಲ್ಲಿ ನಿರಂತರವಾಗಿ ಕೆಲಸಮಾಡುವವರು ಹಾಗೂ ಅವರ ಸಂಸಾರವು ತಂಬಾಕಿನ ಧೂಳು ಹಾಗೂ ಹಾನಿಕಾರಕ ರಾಸಾಯನಿಕಗಳಿಗೆ ಒಳಗಾಗುತ್ತಾರೆ. ಅವರಿಗೆ ವಿವಿಧ ರೀತಿಯ ಬೀಡಿ ತಯಾರಿಕೆಗೆ ಸಂಬಂಧಿಸಿದ ಹಾನಿಕಾರಕ ಖಾಯಿಲೆಗಳಿಗೆ ಒಳಗಾಗುವ ಸಾಧ್ಯತೆ ಇದೆ. ಎರಡು ರೀತಿಯ ವೃತ್ತಿ ಸಂಬಂಧಿತ ಕಾಯಿಲೆಗಳು ಬೀಡಿ ತಯಾರಿಕೆಗೆ ಕಂಡು ಬರುತ್ತದೆ ಎಂಬುದು ಗುರುತಿಸಲಾಗಿದೆ. ಒಂದು ತಂಬಾಕಿನ ಧೂಳನ್ನು ನೇಬಿಸುವುದರಿಂದ ಉಂಟಾಗುವ ಅಪಾಯಕಾರಿ ಪರಿಣಾಮ ಹಾಗೂ ಕಾರ್ಮಿಕರು ಬಹಳ ಸಮಯ ಕುಳಿತುಕೊಳ್ಳುವುದರಿಂದ ಬರುವ ಸ್ನಾಯು ಮತ್ತು ಮೂಳೆಗೆ ಸಂಬಂಧಿಸಿದ ಖಾಯಿಲೆ.

ಈ ವಿಷಯವಾಗಿ ನಾನು ನಿಮ್ಮನ್ನು ಕೆಲವು ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳುತ್ತೇನೆ ಹಾಗೂ ನಿಮಗೆ ಈ ಅಧ್ಯಯನದಿಂದ ಯಾವುದೇ ಸಮಯದಲ್ಲಿ ಹೊರಗುಳಿಯುವ ಅವಕಾಶವಿರುತ್ತದೆ. ನಿಮ್ಮ ಪ್ರಾಮಾಣಿಕ ಉತ್ತರವು ನಮ್ಮ ಅಧ್ಯಯನಕ್ಕೆ ಬಹು ಉಪಯುಕ್ತವಾಗಿರುತ್ತದೆ. ನಮ್ಮ ಈ ಅಧ್ಯಯನದಲ್ಲಿ ನಿಮ್ಮ ಭಾಗವಹಿಸುವಿಕೆಯನ್ನು ನಾವು ಶ್ಲಾಘಿಸುತ್ತೇವೆ. ಅರ್ಧಘಂಟೆಯ ಕಾಲ ಈ ಅಧ್ಯಯನಕ್ಕಾಗಿ ನೀವು ನಮ್ಮೊಡನೆ ಕಳೆಯಬೇಕಾಗಬಹುದು.

ಈ ಅಧ್ಯಯನದಲ್ಲಿ ನಿಮಗೆ ಭಾಗವಹಿಸಲು ಯಾವುದೇ ರೀತಿಯ ಖರ್ಚು ಇರುವುದಿಲ್ಲ. ನಿಮಗೆ ಮಾತ್ರವಲ್ಲದೆ ನಮ್ಮ ಸಮಾಜಕ್ಕೂ ಸಹ ಉಪಯುಕ್ತವಾಗಿರುತ್ತದೆ. ಸರ್ಕಾರದಿಂದ ಪಡೆಯಲಾದ ಆರೋಗ್ಯಕ್ಕೆ ಸಂಬಂಧಿಸಿದ ನೌಲಭ್ಯಗಳ ಮೌಲ್ಯಮಾಪನವನ್ನು ಮಾಡಲು ನೀವು ಕೊಡುವ ಮಾಹಿತಿಯು ಉಪಯುಕ್ತವಾಗಿರುತ್ತದೆ.

ನಿಮ್ಮಿಂದ ಪಡೆಯಲಾದ ಎಲ್ಲಾ ಮಾಹಿತಿಗಳನ್ನು ಗೌಪ್ಯವಾಗಿ ಇಡಲಾಗುವುದು. ಕಾನೂನಿನ ಚೌಕಟ್ಟಿನ ಹೊರಗೆ ಯಾವುದೇ ಕಾರಣಕ್ಕೂ ನೀವು ಕೊಡುವ ಮಾಹಿತಿಯನ್ನು ಬಹಿರಂಗ ಪಡಿಸುವುದಿಲ್ಲ. ನಿಮ್ಮಿಂದ ಪಡೆದಿರುವ ಮಾಹಿತಿಯನ್ನು ಕೇವಲ ಅಧ್ಯಯನಕ್ಕಾಗಿ ಮಾತ್ರ ಉಪಯೋಗಿಸಿಕೊಳ್ಳಲಾಗುವುದು.

ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಸಾಮಾಜಿಕ ಮಾಹಿತಿಯನ್ನು ಪಡೆದು, ದೈಹಿಕ ಪರೀಕ್ಷೆ ಹಾಗೂ ಶ್ಲಾಘನೀಯ ಕಾರ್ಯ ಪರೀಕ್ಷೆ ಮಾಡಲಾಗುವುದು.

ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸಲೇಬೇಕೆಂಬ ಕಡ್ಡಾಯವೇನಿಲ್ಲ, ನೀವು ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸದೇ ಇದ್ದರೂ ನಿಮಗೇನು ತೊಂದರೆಯಾಗುವುದಿಲ್ಲ. ನೀವು ಸ್ವಇಚ್ಛೆಯಿಂದ ಭಾಗವಹಿಸಿದರೆ ಮಾತ್ರ ನಿಮ್ಮ ಸಹಿಯನ್ನು ಈ ಸಮ್ಮತಿ ಪತ್ರದಲ್ಲಿ ತೆಗೆದುಕೊಳ್ಳಲಾಗುವುದು. ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಯಾವುದೇ ಹಂತದಲ್ಲಿ ಹೊರಗುಳಿಯುವ ಅಧಿಕಾರ ನಿಮಗಿರುತ್ತದೆ. ನೀವು ಅಧ್ಯಯನದಿಂದ ಹೊರಗುಳಿದರೂ ಸಹ ನಿಮ್ಮ ಚಿಕಿತ್ಸೆಗೆ ಯಾವುದೇ ರೀತಿಯ ದುಷ್ಪರಿಣಾಮಗಳಾಗುವುದಿಲ್ಲವೆಂದು ಈ ಮೂಲಕ ಧೃಢೀಕರಿಸುತ್ತೇನೆ. ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸುವ ನಿರ್ಧಾರ ತಮಗೆ ಬಿಟ್ಟಿದ್ದು. ಈ ಮಾಹಿತಿಯು ಕಾಲೇಜಿನ ಸಮುದಾಯ ವೈದ್ಯ ಶಾಸ್ತ್ರ ವಿಭಾಗದ ಸುರಕ್ಷಿತ ಲಾಕರ್‌ನಲ್ಲಿ ಇಡಲಾಗುವುದು ಹಾಗೂ ಒಂದು ಪ್ರತಿಯನ್ನು ತಮಗೆ ನೀಡಲಾಗುವುದು.

ಹೆಚ್ಚಿನ ಮಾಹಿತಿಗಾಗಿ ಮುಖ್ಯ ಅಧ್ಯಯನಗಾರರನ್ನು ಸಂಪರ್ಕಿಸಬಹುದು.

ಡಾ|| ಹರೀಶ್.ಎಸ್

ಸಂಚಾರವಾಣಿ ಸಂಖ್ಯೆ: 9945191398

ಅಭ್ಯರ್ಥಿಯು ಸಂದರ್ಶನಕ್ಕೆ ಒಪ್ಪಿ ವೈದ್ಯಕೀಯ ಪರೀಕ್ಷೆಯಲ್ಲಿ ಹಾಗೂ ಶ್ವಾಸಕೋಶದ ಕಾರ್ಯ ಪರೀಕ್ಷೆಗೆ ಸಮ್ಮತಿ ನೀಡಿದರೆ.	1	ಪ್ರಶ್ನೋತ್ತರ ನೀಡಿ ಶ್ವಾಸಕೋಶದ ಕಾರ್ಯ ಪರೀಕ್ಷೆಗೆ ಒಳಪಡಿಸಲಾಗುವುದು ಲಿಖಿತ ಸಮ್ಮತಿ ಪತ್ರವನ್ನು ಪಡೆದು ಕೊಳ್ಳುವುದು
ಅಭ್ಯರ್ಥಿಯು ಸಂದರ್ಶನಕ್ಕೆ ಒಪ್ಪಿ ವೈದ್ಯಕೀಯ ಪರೀಕ್ಷೆಗೆ ನಿರಾಕರಿಸಿದರೆ	2	ಸಂದರ್ಶನ ಮಾಡಲಾಗುವುದಿಲ್ಲ (ಸಂದರ್ಶನ ಫಲಿತಾಂಶವನ್ನು ತುಂಬಿ)
ಅಭ್ಯರ್ಥಿಯು ಸಂದರ್ಶನ ಹಾಗೂ ವೈದ್ಯಕೀಯ ಪರೀಕ್ಷೆಗೆ ಸಮ್ಮತಿ ನೀಡದೆಯೇ ಶ್ವಾಸಕೋಶದ ಕಾರ್ಯ ಪರೀಕ್ಷೆಗೆ ಸಮ್ಮತಿ ನೀಡಿದರೆ	3	
ಅಭ್ಯರ್ಥಿಯು ಸಂದರ್ಶನ ವೈದ್ಯಕೀಯ ಪರೀಕ್ಷೆ ಹಾಗೂ ಶ್ವಾಸಕೋಶದ ಕಾರ್ಯ ಪರೀಕ್ಷೆಗೆ ಸಮ್ಮತಿ ನೀಡದಿದ್ದರೆ	4	
ಪ್ರತಿಕ್ರಿಯೆ ನೀಡುವವರ ಮಾಹಿತಿ ಹಾಗೂ ಸಮ್ಮತಿ ನಾನು, ಈ ಅಧ್ಯಯನದಿಂದ ಯಾವುದೇ ಸಮಯದಲ್ಲಿ ಹೊರಗುಳಿಯುವ ಅಧಿಕಾರವನ್ನು ಪಡೆದಿರುತ್ತೇನೆ. ನನಗೆ ನನ್ನ ಮಾತೃ ಭಾಷೆಯಲ್ಲಿ ಇದನ್ನು ಓದಿ ತಿಳಿಸಲಾಗಿರುತ್ತದೆ. ಈ ಅಧ್ಯಯನದ ಉದ್ದೇಶ ನನಗರಿವಾಗಿರುತ್ತದೆ ಹಾಗೂ ಮಾಹಿತಿಯನ್ನು ಗೌಪ್ಯವಾಗಿಸಲಾಗುತ್ತದೆ ಎಂಬ ವಿಷಯದ ಅರಿವು ನನಗಿರುತ್ತದೆ. ಈ ಅಧ್ಯಯನದ ವಿವಿಧ ಭಾಗಗಳ ಬಗ್ಗೆ ಪ್ರಶ್ನೆ ಕೇಳುವ ಅವಕಾಶವು ನನಗಿರುತ್ತದೆ ಹಾಗೂ ನನಗೆ ತೃಪ್ತಿಯಾಗುವ ಮಟ್ಟಿಗೆ ಉತ್ತರಗಳ ನಿರೀಕ್ಷೆ ಇರುತ್ತದೆ. ನಾನು ಈ ಸಮೀಕ್ಷೆ ವೈದ್ಯಕೀಯ ಪರೀಕ್ಷೆ ಹಾಗೂ ಅಗತ್ಯವಿದ್ದಲ್ಲಿ ಕ್ಷಕೀರಣ ಪರೀಕ್ಷೆಗಳಿಗೆ ಒಳಪಡಿಸಲು ಈ ಮೂಲಕ ಸಮ್ಮತಿ ನೀಡುತ್ತಿದ್ದೇನೆ. ನಾನು ಈ ಸಮೀಕ್ಷೆಯಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳಲು ವೈದ್ಯಕೀಯ ಪರೀಕ್ಷೆಗೆ ಹಾಗೂ ಶ್ವಾಸಕೋಶದ ಕಾರ್ಯ ಪರೀಕ್ಷೆ ಮತ್ತು ನನ್ನ ವೈಯಕ್ತಿಕ ವಿಚಾರಗಳನ್ನು ಹಾಗೂ ಸಮ್ಮತಿ ಪತ್ರದಲ್ಲಿ ರೂಪಗೊಂಡಂತೆ ಬಹಿರಂಗಪಡಿಸಲು ಒಪ್ಪಿದ್ದೇನೆ.		ಸಹಿ/ಅಭ್ಯರ್ಥಿಯ ಎಡಗೈ ಹೆಬ್ಬರಳ ಗುರುತು ದಿನಾಂಕ:
ಅಭ್ಯರ್ಥಿಯು ಸಹಿ ಹಾಕಲು ಅಥವಾ ಎಡಗೈ ಹೆಬ್ಬರಳ ಗುರುತು ನೀಡಲು ನಿರಾಕರಿಸಿದ್ದಲ್ಲಿ		ಅಭ್ಯರ್ಥಿಯು ಶಬ್ದತಃ ಸಮ್ಮತಿಯನ್ನು ನೀಡಿರುವಂತೆ ಸಂದರ್ಶನ ಮಾಡುವವರ ಸಹಿ

ಸಾಕ್ಷಿದಾರರು		1.
		2.
ಮುಖ್ಯ ತನಿಖಾದಾರರು		ಸಹಿ

ANNEXURE IV

Modified BG Prasad classification

Socio-Economic status.^{50,51, 53}

Modified B.G. Prasad classification was used for socio-economic status for rural and urban families according to per capita income for month of Feb 2016 (Consumer Price Index for Month of February 2016- 267)

SOCIO ECONOMIC CLASS	PER CAPITA INCOME
Class I (Upper)	6300 and Above
Class II (Upper Middle)	3150-6299
Class III (Middle)	1890-3149
Class IV (Lower Middle)	945-1889
Class V (Lower)	<944

ANNEXURE V

American Thoracic Society Guidelines⁵⁴

MEDICAL SECTION OF THE AMERICAN LUNG ASSOCIATION

Validity of the spirometry results:

To determine the validity of spirometry results, at least three acceptable spirograms must be obtained. In each test, patients should exhale for at least six seconds and stop when there is no volume change for one second. The test session is finished when the difference between the two largest FVC measurements and between the two largest FEV1 measurements is within 0.2 L. If both criteria are not met after three maneuvers, the test should not be interpreted. Repeat testing should continue until the criteria are met or until eight tests have been performed.

Some of the common errors that may impede the performance of a good quality test are:

- **Hesitation:** If a patient hesitates as he/she attempts to exhale continuously, it results in a false start. In addition to being unacceptable, results are rarely reproducible.

- **Cough in the first second:** Although most patients cough during a forced exhalation, the key is when a patient coughs. If he/she coughs in

the first second, results will not be acceptable. If the individual coughs at the very end, after six seconds of normal exhalation, the results are acceptable; if a tracing of a second exhalation matches the first one, the results are also reproducible.

- **End too soon:** If a patient stops exhaling before six seconds, it's considered ending too soon. Exceptions include patients who feel discomfort or those whose disease prevents them from exhaling for at least six seconds or reaching a plateau.

- **Obstructs the opening:** A patient may partially block the opening in the mouthpiece with his tongue or improperly fitting dentures.

- **Leak around mouthpiece:** In some cases, one may identify a leak only when results are not reproducible despite the patient's best attempt to exhale properly.

ANNEXURE-VI

Spirometry (GOLD criteria 2010):⁵⁵

Normal: FEV₁ and FVC above 80% predicted and FEV₁/FVC ratio above 0.7.

Obstructive: FEV₁ below 80% predicted, FVC can be normal or reduced, usually to a lesser degree than FEV₁ and FEV₁/FVC ratio below 0.7.

Restrictive: FEV₁ normal or mildly reduced, FVC below 80% predicted and FEV₁/FVC ratio normal or above 0.7.

Mixed: FEV₁, FVC and FEV₁/FVC ratio all three decreased.

Features of Ventilatory abnormality in Spirometry:

Parameters	Spirometry findings		
	Obstructive	Restrictive	Mixed
FEV₁	Reduced	Reduced or Normal	Reduced
FVC	Reduced or Normal	Reduced	Reduced
FEV₁/FVC	Reduced	Normal or Increased	Reduced

Annexures VII

OPERATIONAL DEFINITIONS:

The definitions adopted for the study are

AGE: Age was recorded in completed years as revealed by the subjects.

LITERACY LEVEL: Subject's literacy level was classified as:

Illiterate: A person who is not able to read and write with understanding in any language and aged more than 7 years.

Primary: studied up to 1st - 5th standard.

Middle: studied up to 6th - 8th standard.

Secondary: studied up to 9th - 10th standard.

Higher secondary: PUC/Diploma.

MARITAL STATUS:

Married: currently married and staying with the spouse.

Divorced: husband and wife living separate permanently as per court orders.

Separated: husband and wife are living separately but not divorced.

Widow married person whose spouse is dead and doesn't have any life partner.

HOUSE:⁵⁶

Pucca House: A pucca house is one, which has walls and roof made of the following material.

Wall material: Burnt bricks, stones (packed with lime or cement), cement concrete, timber etc

Roof Material: Tiles, GCI (Galvanised Corrugated Iron) sheets, asbestos cement sheet, RBC (Reinforced Brick Concrete), RCC (Reinforced Cement Concrete) and timber etc.

Kutcha House: The walls and/or roof of which are made of material other than those mentioned above, such as un-burnt bricks, bamboos, mud, grass, reeds, thatch, loosely packed stones, etc. are treated as kutcha house.

Semi -Pucca house: A house that has fixed walls made up of pucca material but roof is made up of the material other than those used for pucca house.

CROSS VENTILATION: ²

Doors and window facing each other at work place with no back to back houses.

ADEQUATE LIGHTING:² Means able to read printed words at the corners of the room under natural light.