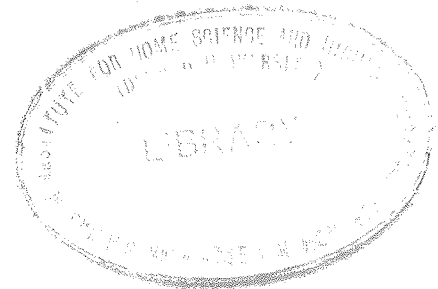


**HEALTH AND NUTRITIONAL STATUS OF
SELECTED WORKING WOMEN IN
COIMBATORE AND THEIR EXPOSURE TO
OCCUPATIONAL HAZARDS**

By

HARSHALA RACHEL PAUL



A Thesis Submitted to the
Avinashilingam Institute for Home Science and Higher
Education for Women (Deemed University),
Coimbatore-641 043, for the requirements
of the Degree of
DOCTOR OF PHILOSOPHY


JULY, 1995

Dedicated to my parents

Mrs. MARY JANE WENRY and
Late. B. WENRY PAUL
and family

CERTIFICATE

This is to certify that the dissertation entitled "Health and Nutritional Status of Selected Working Women in Coimbatore and their Exposure to Occupational Hazards" submitted to the Avinashilingam Institute for Home Science and Higher Education for Women (Deemed University), Coimbatore, for the award of the Degree of Doctor of Philosophy in Food Science and Nutrition, is a record of original research work done by **Ms. HARSHALA RACHEL PAUL, M.Sc., M.Phil.**, Avinashilingam Deemed University, during the period of her study in the Department of Food Science and Nutrition, Avinashilingam Institute for Home Science and Higher Education for Women (Deemed University), Coimbatore, under my supervision and guidance and the thesis has not formed the basis of the award of any Degree/Diploma/ Associateship/Fellowship or similar title to any candidate of any other University.


29.6.95

Signature of the Guide
with date


29/6/95

Signature of the Head of the
Department with date

DECLARATION

I hereby declare that the matter embodied in this thesis is the result of investigation carried out by me in the department of Food Science and Nutrition, Avinashilingam Institute for Home Science and Higher Education for Women (Deemed University), Coimbatore, under the supervision and guidance of **Mrs. S.PREMAKUMARI, M.Sc., M.Phil., Ph.D., Dip. Ed. (Madras)**, Reader in Food Science and Nutrition, Faculty of Home Science, Avinashilingam Institute for Home Science and Higher Education for Women (Deemed University), Coimbatore, and it has not been submitted for the award of any Degree/Diploma/Associateship/Fellowship or similar title of any other University or Institute.

Harshala Rachel Paul

Signature of the Candidate

S. Praveen Kumar

Signature of the Guide

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Contents

LIST OF TABLES

Table No.	Title	Page No.
I	SOCIAL BACKGROUND OF THE FAMILIES STUDIED	36
II	MEAN MONTHLY INCOME OF THE FAMILIES	43
III	PER CENT CONTRIBUTION OF WORKING WOMEN TO THE TOTAL FAMILY INCOME	46
IV	EXPENDITURE PATTERN OF THE FAMILIES	48
V	PERSONAL HABITS OF THE WORKING WOMEN	51
VI	LIVING SURROUNDINGS OF THE WORKING WOMEN	54
VII	WORK PROFILE OF THE SUBJECTS	61
VIII	WORK PATTERN AND TIME DISPOSITION OF WORKING WOMEN	64
IX	REASONS FOR EMPLOYMENT	66
X	PROBLEMS AT WORK	69
XI	WORK CONDITIONS AND FACILITIES PROVIDED AT WORK SPOTS	71
XII	CROWDING AT DIFFERENT WORK SITES	75
XIII	ABSENTEEISM FROM WORK DURING THE PAST YEAR	76
XIV	DETAILS REGARDING EXISTING OHS AT WORK SPOTS	79
XV	EXTENT OF PARTICIPATION OF WORKING WOMEN IN HOUSEHOLD ACTIVITIES	81
XVI	FOOD CONSUMPTION PRACTICES OF WORKING WOMEN	84
XVII	CONSUMPTION OF NON-ALCOHOLIC BEVERAGES	86
XVIII	FOODS GIVEN DURING SPECIAL CONDITIONS/ ILLNESS	88

XIX	MEAN ANTHROPOMETRIC MEASUREMENTS OF THE WORKING WOMEN	92
XX	BODY MASS INDICES OF THE WORKING WOMEN	94
XXI	CLINICAL PICTURE OF THE SUBJECTS	97
XXII	PREVALENCE OF ANAEMIA AMONG THE WORKING WOMEN	99
XXIII	BIOCHEMICAL PICTURE OF WORKING WOMEN	104
XXIV	MEAN FOOD INTAKE OF SELECTED WORKING WOMEN	107
XXV	MEAN NUTRIENT INTAKE OF SELECTED WORKING WOMEN	111
XXVI	REPRODUCTIVE PERFORMANCE OF THE WORKING WOMEN	115
XXVII	COMPLICATIONS BEFORE AND AFTER PREGNANCY AND LACTATION	118
XXVIII	ASSOCIATION BETWEEN MATERNAL MORBIDITY AND REPRODUCTIVE HEALTH COMPLAINTS	121
XXIX	ASSOCIATION BETWEEN BODY MASS INDEX AND NUMBER OF REPRODUCTIVE COMPLAINTS	123
XXX	FEEDING AND WEANING PRACTICES OF WORKING WOMEN	126
XXXI	TREND IN THE PREVALENCE OF OCCUPATIONAL DISEASES AMONG MILL WORKERS IN COIMBATORE DISTRICT	128
XXXII	INCIDENCE OF DISEASES AMONG WORKING WOMEN	131
XXXIII	CORRELATION BETWEEN EOSINOPHIL COUNT AND INCIDENCE OF RESPIRATORY DISORDERS	134
XXXIV	PREVALENCE OF HYPERTENSION AMONG THE WORKING WOMEN	137
XXXV	ASSOCIATION BETWEEN PROVISION OF WORK FACILITIES AND THE INCIDENCE OF OCCUPATIONAL DISEASES	139

XXXVI	ASSOCIATION BETWEEN AGE OF WORKING WOMEN AND THE INCIDENCE OF DISEASES	141
XXXVII	ASSOCIATION BETWEEN LITERACY STATUS OF WORKING WOMEN AND THE INCIDENCE OF DISEASES	144
XXXVIII	ASSOCIATION BETWEEN FAMILY INCOME OF WORKING WOMEN AND THE INCIDENCE OF DISEASES	147
XXXIX	RELATIONSHIP BETWEEN THE DEGREE OF ANAEMIA AND INCIDENCE OF NUTRITIONAL PROBLEMS AMONG THE THREE OCCUPATIONAL GROUPS	149
XL	EFFECT OF DEGREE OF ANAEMIA ON WORK OUTPUT	152
XLI	RELATIONSHIP BETWEEN WORK OUTPUT OF CONSTRUCTION WORKERS AND VARIOUS INFLUENCING FACTORS	155
XLII	RELATIONSHIP BETWEEN WORK OUTPUT OF TEXTILE WORKERS AND VARIOUS INFLUENCING FACTORS	156
XLIII	RELATIONSHIP BETWEEN WORK OUTPUT OF CLERICAL STAFF AND VARIOUS INFLUENCING FACTORS	157
XLIV	INTERACTION BETWEEN VARIOUS FACTORS WITH RESPECT TO OCCUPATIONAL CLASSIFICATION AND DEGREE OF ANAEMIA	162
XLV	MEAN SCORES INDICATING THE IMPACT OF JOB STRESS	165
XLVI	EFFECT OF WORK STRESS ON FOOD INTAKE	167
XLVII	INTERRELATIONSHIP BETWEEN FACTORS CAUSING JOB STRESS AND THEIR EFFECT ON FOOD INTAKE OF WORKING WOMEN	169
XLVIII	HEALTH INDEX FOR PREDICTING THE OCCURRENCE OF DISEASES AMONG WOMEN WORKERS	172

LIST OF PLATES

Plate No.	Title	Page No.
I.	INTERVIEW OF GROUP A SUBJECTS	26
II.	INTERVIEW TO ELICIT DATA ON MORBIDITY PATTERN	26
III.	CLINICAL ASSESSMENT OF A SUBJECT	26
IV.	FOOD WEIGHMENT SURVEY IN PROGRESS	26
V to IX.	ACTIVITIES PERFORMED BY GROUP A SUBJECTS	59
X to XIII.	ACTIVITIES PERFORMED BY GROUP B SUBJECTS	60
XIV.	GROUP C SUBJECTS AT WORK	60

LIST OF FIGURES

Figure No.	Title	Page No.
1.	DISTRIBUTION OF WORKING WOMEN ACCORDING TO THEIR AGE	38
2.	DISTRIBUTION OF WORKING WOMEN ACCORDING TO THEIR LEVEL OF EDUCATION	40
3.	DISTRIBUTION OF WORKING WOMEN ACCORDING TO THEIR INCOME	44
4.	EXPENDITURE PATTERN OF THE FAMILIES OF THE WORKING WOMEN	49
5.	FLOW CHART OF ACTIVITIES OF GROUP A WOMEN - CONSTRUCTION WORK	56
6.	FLOW CHART OF ACTIVITIES OF GROUP A WOMEN - STONE QUARRYING	56
7.	FLOW CHART OF ACTIVITIES OF GROUP B WOMEN - SPINNING AND WINDING	58
8.	FLOW CHART OF ACTIVITIES OF GROUP C WOMEN - TYPING AND OFFICE WORK	58
9.	CLASSIFICATION OF WORKING WOMEN BASED ON BMI	95
10.	PREVALENCE OF ANAEMIA AMONG THE THREE GROUPS OF WORKING WOMEN	100
11.	SCATTER DIAGRAM OF CORRELATION BETWEEN IRON INTAKE AND HAEMOGLOBIN LEVEL OF THE WOMEN	102
12.	FOOD INTAKE OF SELECTED WORKING WOMEN	108
13.	NUTRIENT INTAKE OF SELECTED WORKING WOMEN	112
14.	TREND CURVE OF THE PREVALENCE OF OCCUPATIONAL DISEASES AMONG MILL WORKERS IN COIMBATORE DISTRICT	129
15.	SCATTER DIAGRAM OF CORRELATION BETWEEN EOSINOPHIL COUNT AND RESPIRATORY DISORDERS OF WORKING WOMEN	135

- | | | |
|-----|---|-----|
| 16. | RELATIONSHIP BETWEEN WORK OUTPUT OF
WORKING WOMEN (GROUPS A, B AND C) AND
VARIOUS INFLUENCING FACTORS | 158 |
| 17. | EFFECT OF VARIOUS FACTORS ON THE
POPULATION OF WORKING WOMEN WITH
RESPECT TO OCCUPATIONAL CLASSIFICATION
AND DEGREE OF ANAEMIA | 163 |

LIST OF APPENDICES

Appendix No.

- A. INTERVIEW SCHEDULE TO ELICIT INFORMATION ON HEALTH AND NUTRITIONAL STATUS OF WORKING WOMEN
- B. RATING SCALES TO ASSESS THE IMPACT OF JOB STRESS AND THE EFFECT OF WORK STRESS ON FOOD INTAKE
- C. CHECKLIST ADMINISTERED TO MANAGERS/HEALTH CARE PERSONNEL TO ELICIT INFORMATION ON THE OHS ADHERED TO AT THEIR WORK SPOTS
- D. INDIVIDUAL FOOD INTAKES OF THE WORKING WOMEN
- E. INDIVIDUAL NUTRIENT INTAKES OF THE WORKING WOMEN
- F. BIOCHEMICAL PARAMETERS OF THE WORKING WOMEN
- G. TOTAL CRITERIA SCORES OF THE RATING TESTS
- H. LINEAR MULTIPLE REGRESSION FORMULAE USED FOR CALCULATING HEALTH INDEX

Introduction

INTRODUCTION

It was of the working mother that Arthur Miller thought when he wrote :

The bravest battle ever fought,
Shall I tell you where and when ?
On the maps of the world you will find it not,
It was fought by the mother of men;

- Arthur Miller

Women at work is an upcoming phenomenon in the industrialist societies, be it in the developed or developing world. For social and biological reasons, women have always been the subject of importance in human resource management, primarily because of distinctive repercussions of work environment on women. The working environment, in which women spend a significant part of their functional life has a decisive influence on their health, safety, physical, mental and social well-being.

During the past two decades, three noteworthy trends have emerged-the shift of millions of women to employment outside the home; the expectation of equal employment opportunity and the growth of knowledge about environmental health hazards. There is a growing concern about the implications of these trends on health of women workers. The trends of change in the sex ratio as well as in health, nutrition and education have generally been found to be

adverse to women who have to bear the triple responsibility of rearing children, generating family resources and running households.

With rapid industrialization and urbanisation, increasing numbers of women are seeking gainful employment outside their homes. The International Labour Organisation (ILO, 1992) reported that in India, the labour force participation rate for women had risen from 32 per cent in 1981 to 41 per cent in 1991. Working women (main and marginal) today constitute 22.7 per cent of the total population of India, as against 51.5 per cent of the male workers and most of them are expected to be in the reproductive age period (Census of India, 1991). A major part of the increase has been the result of growing tendency on the part of women to enter the labour market primarily as a result of improvement in their literacy and educational levels.

Work related diseases and accidents cost an estimated one per cent of the gross product of the entire world economy. The ILO's Occupational Safety and Health Branch (1993) reports that over 2,00,000 workers are losing their lives each year while at work and some 120 million, suffering occupational injuries and diseases. In India, the textile industry employs nearly 35 per cent of factory

workers, of whom seven to eight per cent suffer from byssinosis. Over two to 15 per cent of all cases of asthma are of occupational origin (WHO, 1988). Kumar and Kumar (1988) report that working women suffer illnesses more frequently than male workers despite shorter work hours due to the additional burdens of child rearing and housework.

Every occupation carries different types of health hazards and they call for different priorities and Occupational Health Services (OHS). The Joint International Labour Organisation (ILO) and World Health Organisation (WHO) Committees (1981) stress that "occupational health should aim at the promotion and maintenance of the highest degree of physical, mental and social well-being of workers of all occupations". Occupational health implies not only health protection but also health promotion through preventive measures against communicable diseases and occupational hazards and improvement of nutrition and general mental health as stated by National Institute of Occupational Safety and Health (NIOSH, 1991).

The major categories of occupational hazards for workers are chemical, physical and biological agents/conditions, psycho-social factors and occupational accidents. Malnutrition, anaemia, communicable diseases and other health problems may also intensify occupational health

hazards. Many diseases produce increased sensitivity of workers to occupational hazards.

It is a well documented fact that women in India, in general, suffer from the effects of discrimination in matters of food, health care and education. Such discrimination from birth makes them a very vulnerable group and this deprivation makes them physically weaker and thus more susceptible to illnesses caused by occupations they are engaged in.

Overwork, is perhaps the most common occupational hazard of women. The capacity of women for sustained heavy physical work is substantially lower than men. Yet most women, perform some of the hardest tasks for long stretches of time (Sudhir, 1992). By and large, the subject of occupational health is still to make a dent in the Indian context.

Nutrition is a vibrant index of the quality of life and it reflects the status of the economy and well-being of the population. In any working community, while an adequate diet will improve their performance, measures to improve the diet and the nutritional status of workers will be ineffective, from the point of view of working efficiency, as long as chronic diseases and occupational health hazards, are not eliminated (Sen, 1980 and Kochupara, 1992).

A high percentage of industrial workers in India is malnourished due to low income, faulty food habits, infection and infestations. The average diet of the working class in all the less developed countries today is almost invariably deficient in calories, animal proteins, vitamins and minerals necessary for the maintenance of proper health (Park and Park, 1989).

The exact extent to which inadequate food consumption through the resulting poor nutritional status reduces working efficiency escapes accurate measurement. But almost all researchers who have studied this subject in different countries, agree that a poor diet is an important cause of reduced capacity for work because the body tends to protect itself from the lack of proper food by avoiding effort, the final result being lethargy, leading to a considerable amount of absenteeism because of sickness and causing fatigue quickly leading to higher accident rates (Kaur and Sood, 1988).

In India, worth while data on most of the occupational hazards is not available. The basic impetus to the present study came from trying to understand the immediate microcosm of today's working woman, which ultimately affects her role in society. The traditional approach to studying the etiological factors affecting the total health of working women has been far from satisfactory as it solely relied on

medical history or nutritional assessment. Important contributory factors such as exposure to occupational hazards, stress, urbanization etc., have not received the attention they require. The full nature and extent of the health burden resulting from occupational and environmental exposures remains to be elucidated. Hence the present study, "Health and Nutritional Status of Selected Working Women in Coimbatore and their Exposure to Occupational Hazards" was planned. It aimed at associating the various etiological factors including socio-economic, occupational, nutritional factors and medical history.

The primary objective of this investigation was to study the health and nutritional status of selected groups of women from three occupational categories namely primary (ie., construction workers), secondary (ie., textile workers), and tertiary (ie., clerical staff) sectors. The specific objectives were to :

1. Study the socio-economic background and food consumption patterns of the working women.
2. Assess the nutritional status and work efficiency of women and influencing factors.
3. Study the cause and effect of work stress on food consumption practices of working women.
4. Examine the OHS provided and
5. Interpret the results in terms of a health index, socio-economic variables (income and occupation) and subject variables (age and health).

Review of Literature

II. REVIEW OF LITERATURE

The literature for the present study entitled "Health and Nutritional Status of Selected Working Women in Coimbatore and their Exposure to Occupational Hazards", is reviewed under the following headings :

- A. Occupational Health Problems Faced by Working Women
- B. OHS Legislation in India for Women
- C. Nutritional Status and Work Output and
- D. Recent Studies Pertaining to Occupational Diseases and Nutritional Status of Workers

A. Occupational Health Problems Faced by Working Women

The Committee on the Status of Women in India (Shramsakthi, 1988) has identified malnutrition caused by poverty, over work and repeated pregnancies as the foremost factor ultimately affecting the wage earning capacity of women. Illiteracy, ignorance, food fads and fallacies, inadequate medical facilities, poor occupational safety measures and child care services further aggravate their condition, resulting in greater incidence of physical disabilities and morbidity.

Women's health is also affected by unfavourable social conditions which are reflected in statistics like the low sex-ratio in the country; high infant mortality, female infanticide, discrimination against girls, early marriage

and child-bearing, high maternal mortality, hard work and problems relating to reproduction (Rajagopalan, 1982; DEW, 1986; NIN, 1989; Devadas, 1990 and Census of India, 1991).

Devadas et al. (1982) has stressed that the health and nutritional status of mothers, especially working women, be given adequate priority as they are the producers and care takers of children - the future labour force. In addition women doing moderate or heavy work, such as agricultural workers, require extra energy to cope with the triple burden of house work, child care and stresses of their occupations.

In general it is seen that there is a concentration of women at the lower level of employment which indicates that they are assigned mainly unskilled jobs and are rarely offered promotions within the factory. Further, as modern capital intensive technology is introduced, women especially in textile industries, lose out because men are preferred to tend the new machines, equipped with new skills and training.

Urbanization has put severe strain on job opportunities and women are forced to take up whatever jobs are available. Though it has had a positive effect on the general status of women, urban females are at a disadvantage as they are pushed into the sphere of casual, unorganised, poorly paid

and strenuous labour. High maternal morbidity and mortality, household drudgery, prolonged work hours and occupational hazards, contribute to the low health profile of Indian Women (Shramsakthi, 1988 and Satyanarayana, 1989).

Apart from the general problems faced by women at work, every field of occupation poses some specific threats to the health of women. A few descriptions are given below :

1. Women in agricultural sector

Agricultural workers face a multitude of occupational hazards ranging from effect of climate and pesticides, accidents, stresses and strains, respiratory and zoonotic diseases. Five to ten thousand people die every year in Punjab, Hariyana and Uttar Pradesh due to agriculture-related injuries (Mohan, 1991). Of the most common hazards from exposure to herbicides and pesticides are anaemia, menstrual dysfunction, birth defects and stillbirths (Pesticide Action Network, 1992).

2. Women in stone quarrying and construction industry

Women who crush stones in stone quarries and construction sites are subjected to extreme temperatures and stone dust. Carrying heavy loads and going up ladders can cause spontaneous miscarriage in pregnant women. For others, their work leaves them with a wide range of health complaints from physical stress and strain; skeletal

defects; numbness of hands and fingers; loss of hearing; stress; high blood pressure; muscular pain; intestinal problems like gastroenteritis; respiratory problems; asthma; silicosis; asbestosis; skin diseases; heat cramps and sun burns; serious accident injuries; deaths; spontaneous miscarriages; high rate of infant mortality and a feeling of isolation and rootlessness (Sudhir, 1992).

3. Women involved in manual labour

Manual workers commonly suffer from nutritional deficiencies as a consequence of inadequate diets, lifting heavy weights, heavy work load and continuous heavy work from childhood through illness, pregnancy and in the post partum period, to old age. Health problems include disturbances of blood circulation; postural problems; menstrual disorders; prolapse of uterus; miscarriage or stillbirth; risk of injury to spinal column and adjacent muscles; deformities; callouses, neuritic pains and paralysis (DEW, 1986).

4. Women in manufacturing sector

Women in the manufacturing sector also have problems stemming from the difficult postures they are compelled to adopt. Those who make beedis, paperbags, lace, gunny bags, carpets etc., have to sit constantly in one position, stooping over their work (DEW, 1986).

Constant contact with dyes, cashew oil, gases like carbon monoxide and formaldehyde, chemical fumes, tobacco dust and silica, all pose serious hazards (WHO, 1991 and 1992). Silicosis, irritation of the upper respiratory tract, burning sensation in hands and sweating of palm are common complaints (Sudhir, 1992).

5. Women in electronics industry

A lot of work women do is monotonous like typing, stitching and fitting in circuits which requires repetitious movements, resulting in roughened palms and pain in the arms and shoulders respectively. Repetitious movements dull the brain and cause fatigue thus leading to accidents (NIOSH, 1991).

In the electronics industry women fit in circuits day in and day out and such work requires movement of only their hands and shoulders. Therefore, they often suffer from a condition called "tenosynovitis".

Women working indoors have problems of different kinds related to poor environment - lack of light, space and ventilation causing poor vision, eye strain and headaches (Ghodasara et al., 1992).

Results of several studies (Schnorr, 1989 and NIOSH, 1991) indicate that video terminal display operators report

frequent visual and musculo-skeletal strains and discomfort. Improving ergonomic conditions, reduced visual and musculo-skeletal complaints and increased work efficiency.

6. Women in textile and garment industry

Textile and garment workers often complain of postural problems; repetitive movements causing pain in arms, legs, lower back, neck and abdomen; swelling of limbs; persistent muscular pain; headaches; fever; visual fatigue; dizziness; exhaustion; insomnia; finger injuries; leucorrhoea; burning and itching sensation while urinating. Stress is a common complaint voiced especially by women in the service sector (Johnson, 1989).

B. OHS Legislation in India for Women

The Indian Constitution calls upon the government "to direct its policy towards securing the health and strength of workers, men and women and that citizens are not forced by economic necessities to enter vocations unsuited to their age and human conditions of work" (Directive Principles Article, 39C and 42). However the efforts taken by the Government are inadequate when compared to the developed countries which have revolutionized industrial laws and formed comprehensive legislations on occupational health (Kochupara, 1992).

Some important legislations which speak about workers' health are the amended Workmen's Compensation Act (1923), Factories Act (1948), Plantation and Labour Act (1951), Mines Act (1952), Beedi and Cigar Workers' Act (1981) (Park and Park, 1989).

These Acts cover a range of provisions for the workers such as disposal of wastes; provision of drinking water, latrines, spittoons, canteen, shelter, work rooms and cloth-drying facilities; periodic occupational health and safety surveys; maintenance of medical reports; compensation for occupational diseases and accidents, etc. Section 9 A of the Mines Act 1952, delegates all power to the inspector of factories and his office to undertake occupational health and safety surveys.

And if any worker is found suffering from an occupational disease caused by prevailing work conditions it is the duty of the owner/manager to provide compensation. The Indian Government has taken many legislative measures to protect the large percentage of women labour force against exploitation.

1. The Factories Act (1948, amended in 1978) prescribed the time limit of nine hours per day, to be done between 7.00 a.m. and 6.00 p.m. in factories, mines and plantations.
2. The Mines Act of 1951 prohibits women from working underground.

3. Protection is given to women by law in forbidding them to lift weights in excess of 65 lbs. per adult woman and 45 lbs. per adolescent.
4. Child welfare and maternity benefits are to be implemented by providing crèches in factories that employ more than 20 women and rest periods for mothers to feed their babies.
5. Legal protection for women workers is assured following the recommendation of the International Labour Organisation which is endeavouring to make the lives of working women happier by sanctioning to them all rights and facilities for education and employment (Vohra and Geri, 1989).
6. The Equal Remuneration Act merely provides for maternity leave with wages and protects woman from being dismissed or demoted in rank during her maternity period (Kamath, 1994).

Though these laws have gained some ground, they have been found to be grossly inadequate. The Tamil Nadu Forum for Creches and Child Care Services (1993), a federation of organisations involved in working on the issues of maternity and child care, has launched a campaign to review the laws, policies and programmes in India as "the existing programmes and schemes are not sensitive to women's role as workers". Workers must have the right to know and to participate in implementing welfare and safety measures and if they are not satisfied must have the right to refuse (Francis, 1992 and Jayaraj, 1992).

C. Nutritional Status and Work Output

The old adage that "an army marches on it's stomach", attributed to Napoleon, indicates an early awareness of the

relationship between nutrition and productivity, in this case the performance of soldiers. In world war II, Buzina et al. (1982) who studied the influence of caloric supplementation on the work output of labourers in German industries during periods of food scarcity, found that productivity measured as tons of material moved per hour, increased 47 per cent when caloric intake was increased by 480 kcal/day.

'Physical work capacity' is the ability to perform maximum physical work as it is a function of the intensity and duration of work. Each individual has many different capacities such as anaerobic, aerobic and endurance capacity, each with its own limiting factors. In practice, aerobic work capacity (VO_2 max) is the capacity most often considered.

'Work performance' has different meanings in standardized and non-standardised conditions of work. In the former, it can be defined as either the response to work, as indicated by physiological indices, such as changes in heart rate, oxygen consumption and blood lactate, or the work accomplished for a given physiological response. In non-standardised tasks it is the work accomplished, which depends on factors such as the rate of work, motivation, skill, etc.

Studies in nutritionally malnourished men have shown that the physical work capacity is dependent on nutritional status. Undernourished subjects have depressed work capacities due largely to decreased muscle mass. Since productivity in hard physical work is also directly related to physical work capacity, by implication productivity of undernourished individuals would also be depressed in heavy physical work (Schurch and Scrimshaw, 1987). Bergstrom et al. (1985) and Schurch and Scrimshaw (1987) demonstrated that the maximum endurance time in humans is directly related to the initial glycogen content of skeletal muscle.

Satyanarayana et al. (1989) in a study on rural teenage boys found a statistically significant correlation between body weight and wages earned in agricultural jobs even after partialling out the influence of age and height. Immink (1989) also found a significant correlation between adult stature and productivity in sugarcane cutters. They concluded that those workers who suffered from protein-energy deficiency during childhood and adolescence would expect their productivity in sugarcane cutting to be relatively affected. Viteri and Torun (1981) after several studies on Guatemalan agricultural workers concluded that improved nutrition has a favourable effect on both per capita income and improved quality of life for people. A significant correlation between the working capacity of

anaemic and non-anaemic workers in terms of lower scores for physical performance test for anaemic subjects than their non-anaemic controls was observed. To perform energy demanding hard physical labour, blood must be able to transport oxygen at an adequate rate which in turn depends upon the circulating levels of haemoglobin.

Out of 500 million women in the developing countries (excluding China) about 70 million are pregnant at a point of time and nearly two-thirds of them i.e., 48 million have anaemia. About half of the non-pregnant women i.e., 200 million are anaemic thereby making a staggering total of 250 million (Kumar and Kumar, 1988). In a study by Vijayalakshmi (1987) of 100 pregnant women workers, the average haemoglobin level was found to be as low as 10.52 g/100ml.

D. Recent Studies Pertaining to Occupational Diseases and Nutritional Status of Workers

1. Occupational diseases

Cherian et al. (1992) observed that an array of industries, contributed to high levels of iron, zinc and aluminium in the chloride or nitrite form, occurring in the ambient air in Bombay, which was related to respiratory and nervous system connected diseases in men. For the prevention of health problems at work sites, cyclone separator was recommended, as it was economical and efficient.

Tiwari (1987) upon assessing the hazard indices of toxic elements from coal-based power plants, stated that adverse health effects would occur on exposure to barium, chromium, copper, lead, cadmium and arsenic in those plants.

Popkin et al. (1976) reported that a 56 year old theatre sister who had worked in an operating theatre for 11 years suffered from occupational asthma due to methyl methacrylate present in the 'bone cement' she handled. Significant prevalence of hepatitis B virus (HBV) (32 per cent) was noticed in employees of a blood transfusion centre by Adhikari and Murti (1988) and they attributed it to improper handling of test materials.

Backyavathy et al. (1987) studied the incidence of respiratory diseases among 500 workers exposed to occupational and environmental risks of tanneries at Ranipet industrial town, using morbidity data collected from (ESI) health cards for five years. The occurrence of bronchitis, acute pharyngitis, asthma and tuberculosis was among 32.8, 31.8, 2.8 and 2.2 per cent of tannery workers and 20.2, 5.6, 2 and 3.6 per among control subjects respectively for various age groups (18 to 70 years).

2. Nutritional status of workers

Anbu (1987) reported that inadequate nutrition led to ill-health among women weavers of Woriyur weaving societies, which posed a health hazard and ultimately influenced the quality and quantity of work done.

Mehta and Bansal (1985) concluded that low food intake by industrial workers precipitated undernutrition, reduced physical work capacity and increased the extent of fatigue, accident rate sickness and absence from work.

Nation wide research carried out by the National Institute of Nutrition (NIN) proves that iron deficiency anaemia, is a common health problem affecting not only children and pregnant women but also working adults, especially women. Taking the cue from the iodised salt approach, NIN has developed technology for fortification of common salt with iron (Murthy, 1993). Mukherjee et al. (1991) analysed 1281 blood samples and 34,534 birth data from both industrial and rural areas of Calcutta and noted no marked variation in the distribution of haemoglobin types with controls.

In a study of 100 pregnant women of low socio-economic group, consumption of cereals, green leafy vegetables, fruits, sugar and jaggery was low resulting in grossly low intakes of calories, vitamin A and iron. Only one-third of

the women consumed special pregnancy foods. Clinically and biochemically, anaemia was most common. Total serum protein was normal though 89 per cent showed albumin levels of 3.5 g/dl. Majority of the subjects claimed to eat less during pregnancy but claimed that their work pattern was maintained (Gopalan, 1993).

Maini et al. (1980) and Westrich (1987) studied 476 subjects (age 20-23 years) by use of radiographic femoral trabecular pattern index and found the incidence of osteoporosis to be 23 per cent in workers engaged in hard, physical labour compared to 47 per cent in workers with sedentary occupations.

Roy (1991) who studied the health status of 500 adult Oraon tea garden labourers of North-West Bengal stated, that ailments like cough, anaemia, sore-throat, abdominal pain, headache, backache, chest pain and diarrhoea were reported to be "most frequent" complaints by females while it was only "frequent" for male farmers.

Studies in nutritionally normal and malnourished men have shown that physical work capacity (as measured by VO_2 max), is dependent on nutritional status such that, relative to the degree of malnutrition, undernourished subjects have depressed work capacities due largely to decreased muscle

mass. Studies on load-carrying in men and boys indicate that only the body weight and weight of the load carried influence energy expended, independent of nutritional status (Schurch and Scrimshaw, 1987 and Spurr et al., 1987).

Experimental Procedure

III. EXPERIMENTAL PROCEDURE

The experimental procedure involved in the conduct of this investigation entitled "Health and Nutritional Status of Selected Working Women in Coimbatore and their Exposure to Occupational Hazards" consisted of the following steps :

- A. Selection of Samples
- B. Formulation of Interview Schedule and Conduct of Survey
- C. Assessment of the Nutritional and Health Status of Working Women
- D. Assessment of Work Performance and Stress Evaluation
- E. Survey of Employers/OHS Personnel and
- F. Data Analysis

A. Selection of Samples

Since most occupations pose characteristic hazards, it was decided to conduct a cross-sectional study of working women belonging to three main occupational categories - primary, secondary and tertiary sectors. The classification details as given by Perumalsamy (1985) and Government of India Statistical Records (1992) are as follows :

- i) Primary sector - agriculture, forestry, fishing, mining, quarrying and construction
- ii) Secondary sector - manufacturing including textiles and
- iii) Tertiary sector - service occupations, transport, storage and communication.

In the present investigation women involved in quarrying and construction work, spinning work in textile mills and clerical work were considered for the three respective occupational sectors. In the primary sector, though 44.7 per cent of the workforce is involved in agricultural activities, they were not considered because they were widely scattered over a great area providing difficulty in easy accessibility; further agriculture as an occupation consists of a variety of specific tasks, each task associated with specific occupational hazards. Next to agriculture, in the primary sector, women constitute 20.79 per cent of the workforce in quarrying and construction work. Since this group was available within the city, women belonging to this occupation were considered for the primary sector. In the "cotton city" of Coimbatore popularly known as the "Manchester of South India" 29.2 per cent of the total number of workers in textile mills are women and hence these women were considered for the secondary sector. Since typists and stenographers were easily available in offices, they were chosen for the tertiary sector.

In the present investigation, a total of 600 working women - 200 each from three specific subgroups - group A (primary), group B (secondary) and group C (tertiary), each representing an occupational sector were selected. From out

of the six quarries and 332 registered cotton textile factories in Coimbatore city, two stone quarries (granite) and six cotton spinning and weaving factories were selected in order to get the required number of subjects depending on their proximity and permission granted by the managements.

Twenty two construction sites were selected by the investigator among which only two firms were formally registered under the Coimbatore Corporation. As data was unavailable regarding the number of clerical staff of the tertiary sector, 200 typists/stenographers from 26 offices were randomly selected.

In the selection of subjects, working women aged 20 and above with a service span of atleast two years were randomly selected, using service registers, when maintained at the different work sites as suggested by Pal et al. (1992).

Quota sampling method was chosen as it provides the smallest sampling error and provides the most information for the available resources. Gupta (1991) states that when optimum quota sampling procedures are used and more of few sub-group analyses are performed, the desirable sample size in terms of people or households at the regional level is 200 to 500.

B. Formulation of Interview Schedule and Conduct of Survey

In order to elucidate information on the health condition of the subjects their socio-economic background and details on occupation, an interview schedule was formulated.

The schedule consisted of the components namely socio-economic details household work participation, reasons for seeking employment, disadvantages voiced, nature of job, work distribution at home and job, absenteeism from work during the past year and home environment. Information on the work conditions and facilities provided at the work spots were also collected. A standardised questionnaire obtained from the National Institute of Occupational Health and Safety, USA, was used while formulating the questionnaire. The questionnaire also had a component of dietary assessment with details on daily meal pattern, family food consumption practices and foods given during special conditions/illness.

A pilot study was performed on five per cent of the selected sample ie., 30 working women, as suggested by Gupta (1991). Based on the results, relevant corrections were made and the questionnaire finalised (Appendix A). The finalised questionnaire was administered to all the 600 subjects through interview method (Plates I and II) and data was collected.

C. Assessment of Nutritional and Health Status of Working Women

1. Anthropometric measurements

The anthropometric measurements namely, height, weight, triceps skin-fold thickness and mid-arm circumference of the 600 women were collected by the investigator using the standard procedures (Jelliffe, 1978) as given below :

a. Height

Height was measured using a portable stadiometer, to the nearest half centimeter, with the woman standing straight without sandals, with heels together and with shoulders, buttocks and heels touching the scales. The height was recorded with the beam pressing the head and resting firmly on the vertex.

b. Weight

The individual was weighed, after emptying the bladder, preferably before the mid-day meal. A portable weighing scale was used for obtaining weight in kilograms corrected to the nearest quarter kilo. The accuracy of the scale was checked daily before and after taking weights of the subjects, by using a standard weight.

c. Skinfold thickness

Skinfold thickness at the triceps was measured to the nearest 0.2 mm using a Harpenden skinfold calipers. The subject was made to stand with her back to the investigator and her arm hanging relaxed at the side. The skinfold measurement was done accurately as per the procedure given by Jelliffe (1978).

d. Mid-arm circumference

Mid-arm circumference was measured using a non-stretchable PVC coated fibre glass tape. Measurements were made to the nearest 0.2 cm.

2. Clinical assessment

The general appearance of a subject often presents a clue to the state of health. In order to assess the clinical picture of the subjects, a schedule was developed as per the guidelines given by Shramsakthi (1988), Swaminathan (1988), and Park and Park (1989) (Appendix A) and the assessment was done on all the 600 subjects (Plate III).

3. Biochemical assessment

Several studies have proven a correlation between haemoglobin concentration and work capacity and even minor decrements affect performance (International Nutritional Anaemia Consultative Group, 1981). According to the WHO (1988) of all countries in the world, India has the highest prevalence of nutritional anaemia in women.

Hence the concentration of blood haemoglobin was analysed for the 600 women using the Cyanmethaemoglobin method, using finger prick blood samples collected (Varley, 1980). A sub sample of 10 per cent of the selected sample of working women (ie., 60 women, 20 from each of the groups A, B and C) was randomly chosen for in depth biochemical assessment as well as three-day food weighment study.

Random blood sugar, total protein, total serum cholesterol level and differential eosinophil count were estimated by drawing seven ml of venous blood, using ortho-toluidine method, ortho reagent method, ferric chloride-sulphuric acid method and slide method (NIN, 1983), respectively.

4. Medical history and examination

Medical history in the form of medical records, and ESI records were collected from the 600 women. In addition to the clinical assessment by the investigator, they were examined by a physician who helped in clearly identifying and differentiating non-occupational and occupational diseases/disorders. This was performed in order to avoid bias in recording the incidence of occupational diseases, which may have occurred if non-occupational diseases of genetic, environmental or unknown origin, had not been identified.

While identifying work-related diseases and injuries, the list of signs and symptoms of the ten leading occupational diseases, put forth by NIOSH (1992) was used. In addition, information on marital status, reproductive performance, infant mortality rate, complications during pregnancy and lactation and frequency of use of medications and supplements consumed was gathered.

5. Three-day food weighment study

Assessment of food and nutrient intakes of the sub sample of 60 working women was performed by conducting a three-day food weighment survey whereby the raw ingredients used before cooking the meals and total cooked weight of food were weighed for three successive days, using standard measuring cups and spoons. The actual amount of cooked food consumed by the women was measured and corresponding raw equivalents of the food consumed, were determined (Plate IV). The mean nutrient intakes of the subjects were computed using the ICMR Tables of Food Composition (ICMR, 1990).

D. Assessment of Work Performance and Stress Evaluation

1. Measurement of work units

Work performance of the subjects was measured by observing their capacity to do work for a day and the number of units or products produced and active work hours. In the case of construction workers (group A), the number of

granite stones/bricks/bags or metal baskets of "Jalli" (ie., cement, sand and stone mixture) broken and carried by each subject per day was recorded. The performance of textile workers (spinners - group B) was recorded by noting the number of spools of cotton yarn produced per day. The work performance of clerical staff was assessed by making them type a given passage within ten minutes and taking into account their speed (ie., time taken) and perfection of work (ie., number of mistakes committed).

2. Measurement of blood pressure and pulse rate

The pulse rate and blood pressure of all 600 women were recorded before and after one hour of work, preferably in the fore-noon, to study the rate of change among healthy and undernourished/anaemic subjects.

3. Stress evaluation

Occupational health specialists are concerned about the increased level of stress experienced by people at work and are attempting to find ways of reducing stress and preventing breakdown in mental and physical health (Jayaraj, 1992 and NIOSH, 1992). Two rating scales, based on pertinent criteria listed by Bernard (1991), NIOSH (1991) and Selvarani (1992) were formulated with the aim of identifying the significant causes of job stress faced by working women and their effect on food consumption practices.

The two rating scales were pre-tested, modified with the help of qualified psychiatrists and rating scale tests were conducted using interview method, on the sub sample of 60 women. The rating scales used are furnished in Appendix B.

E. Survey of Employers/OHS Personnel

Baker (1991) states that surveillance system in Occupational Health Services plays a crucial role in protecting the interests of the worker, as it monitors the rates of occurrence of recognized health problems or hazards, identifies and does follow-up of cases of illness or injury caused by job hazards and are used as tools in planning, implementing and evaluating the various public health intervention programmes (Langmuir, 1976).

During the course of the study, secondary data on the labour force participation rates of women in Coimbatore and their morbidity records, were obtained from the Government Statistical Department, Directorate of Factories and ESI Regional Administrative Medical Office, Coimbatore. But as health records were non-existent in some worksites and where maintained they were found biased and poorly maintained, a survey of the employers concerned/OHS personnel was carried out to ascertain the presence or absence of OHS at their work sites and if present, their nature, functioning

efficiency and compliance with the Factories Act, ESI and other salient legislation.

A check list was formulated using the criteria stated by NIOSH (1991) and Jayaraj (1992). It was pretested and modified, and 30 willing managers/health care personnel/authorities in-charge of personnel, were interviewed. The checklist (Appendix C) consisted of two major parts, the former dealt with details regarding the OHS personnel in terms of their designation, qualifications, and experience, while the latter part dealt with the actual OHS provided by the respective managements, in terms of medical treatment, first-aid, engineering management, occupational hygiene, approach of the OHS, crowding and area of ventilation per unit area, health counselling, health education, nutrition and food service management.

F. Data Analysis

In the present study descriptive statistics - frequency distributions, means, standard errors or standard deviations and cross tabulations, that are basic to understanding the collected data have been used. The mass of data collected, edited, classified and tabulated was also treated statistically using appropriate tests of significance - students 't' test for differentiating scores of stress tests, trend curve for predicting morbidity pattern of

working women; chi-square test for associating the presence of work facilities and incidence of occupational diseases; F-test (ANOVA) and Karl Pearson's coefficient of correlation for assessing the degree of influence of various factors on work output/morbidity pattern and linear multivariate regression analysis for predicting health indices of working women.

Results and Discussion

IV. RESULTS AND DISCUSSION

The results of this study entitled, 'Health and Nutritional Status of Selected Working Women in Coimbatore and their Exposure to Occupational Hazards' are discussed under the following captions:

- A. Socio-Economic Profile of Working Women
- B. Occupational Profile of Working Women
- C. Food Consumption Practices and Dietary Assessment of Working Women
- D. Nutritional Profile of Working Women
- E. Reproductive Profile of Working Women and Effect of Employment on Child Care
- F. Incidence of Occupational, Non-Occupational and Nutritional Disorders and the Influencing Factors.
- G. Work Performance and the Various Influencing Factors.
- H. Factors Causing Job Stress and their Effect on Food Consumption Practices and
- I. Health Index.

A. Socio-Economic Profile of the Working Women

1. Social background of working women

The social background of the families of the 600 working women is presented in Table I.

TABLE I

SOCIAL BACKGROUND OF THE FAMILIES STUDIED

S.No.	Characteristics	Details	(n=200/group)		
			Group A (%)	Group B (%)	Group C (%)
1.	Age (yrs)	20 - 29	35.5	30.0	68.5
		30 - 39	32.5	40.5	23.5
		40 - 49	24.0	24.0	8.0
		50 - 59	8.0	5.5	0
Mean age (yrs & mo.)			34.6	35.0	27.0
			+9.6	+7.9	+7.4
2.	Religion	Hindu	92.5	86.0	60.0
		Muslim	2.5	5.0	5.0
		Christian	5.0	9.0	35.0
3.	Literacy status	Illiterate	73.0	9.5	0
		Primary to middle school	26.5	57.5	0
		High school and higher secondary school	0.5	33.0	9.0
		College	0	0	91.0
4.	Family type	Nuclear	68.5	71.5	70.5
		Joint	31.5	28.5	29.5
5.	Family size	1 - 3	17.5	38.5	37.0
		4 - 6	63.0	54.0	54.5
		> 7	19.5	7.5	8.5
Mean number			6.0	4.8	4.9
			+2.1	+2.1	+1.6

a. Age

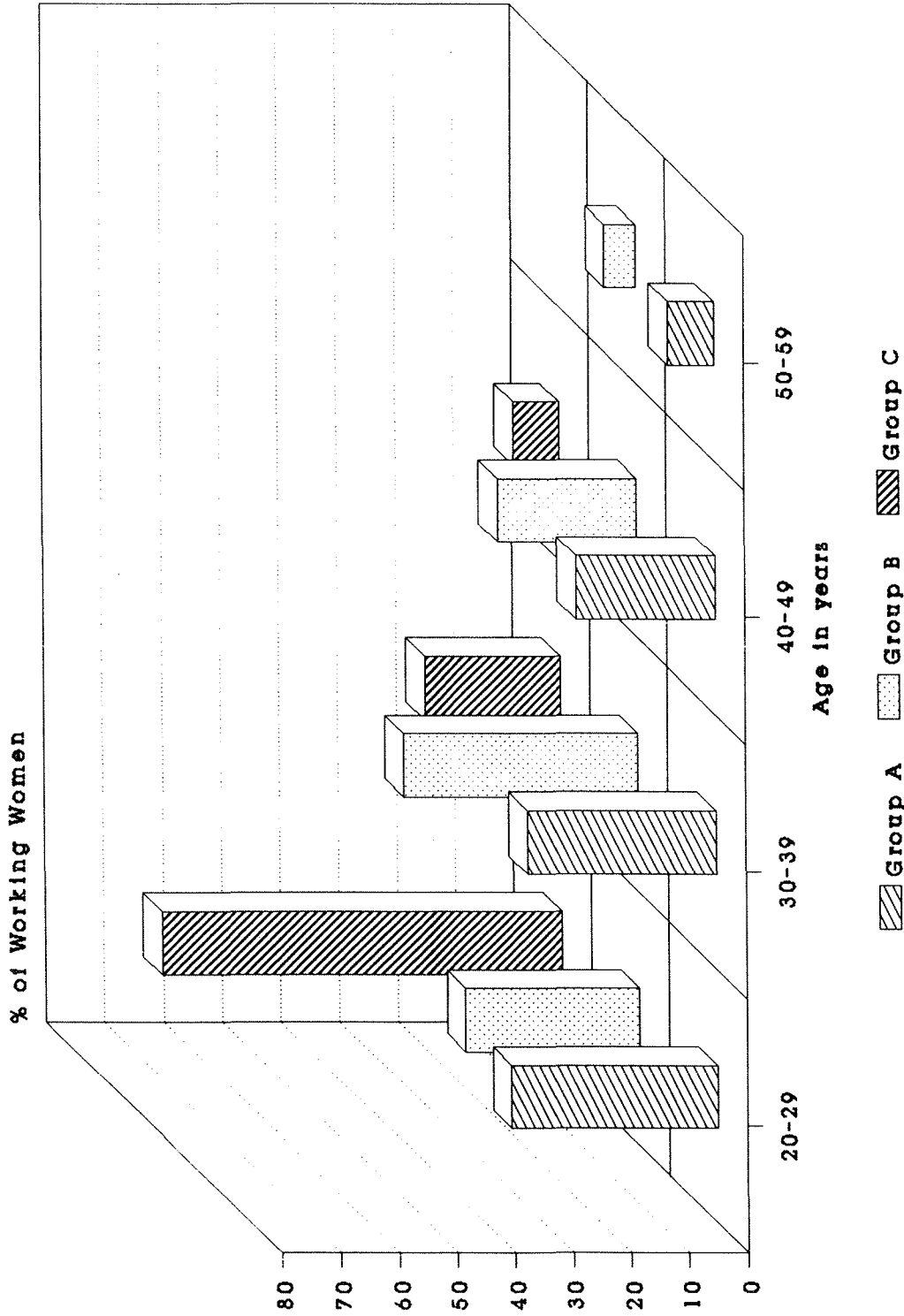
Table I and Figure 1 revealed that the mean age of women in groups A, B and C were 34.6 ± 9.6 ; 35.0 ± 7.9 and 27.0 ± 7.4 years and months respectively. Nearly 70 per cent of group C workers were aged 20-29 years, while 35.5 and 30 per cent of subjects in groups A and B were of that age group. Only eight and 5.5 per cent of workers from groups A and B were above 50 years old.

Age has been found to influence factors like production, health and occupational capacity. Rahamathullah (1983) reported that in the labour intensive tea estates of the Nilgiris, 56 per cent of the labour force were women, majority of whom belonged to the 25 to 44 years age group. A study in North India revealed that women in the 18 to 34 years age group formed the majority of working mothers in Uttar Pradesh State (Mascarenhas, 1988).

The present study also revealed a similar age pattern among the working women. Of the three groups studied, the subjects involved in clerical work were found to be younger than the other two groups.

b. Religion

In the present study, majority of the women surveyed were Hindus. Muslims constituted about five per cent. Christians and followers of other religions constituted the



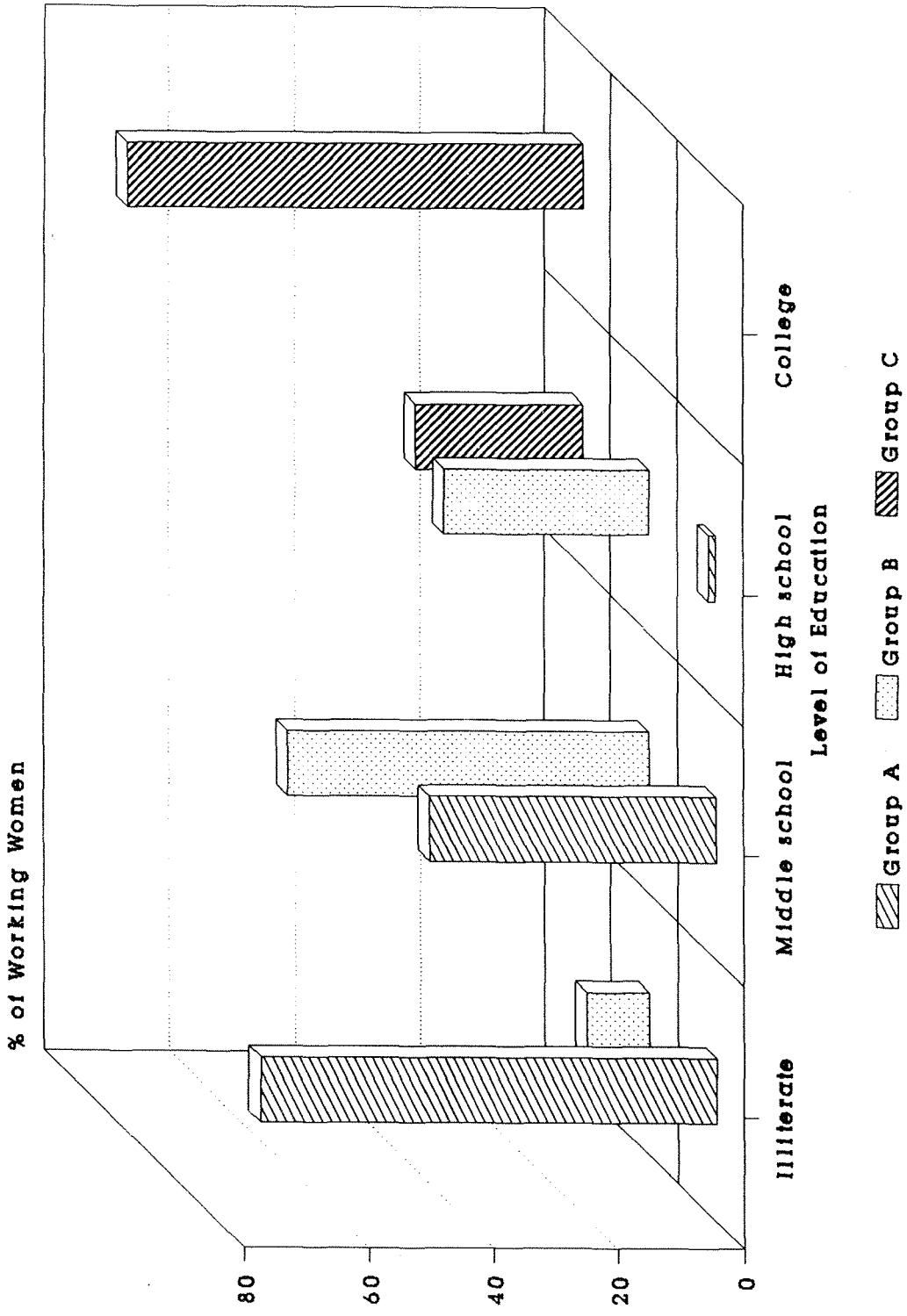
DISTRIBUTION OF WORKING WOMEN ACCORDING TO THEIR AGE
FIGURE 1

rest of the population (5 % - group A, 9 % - group B and 35 % - group C).

c. Level of education

Most of the women of group A were illiterate, majority of group B were semi-literate with middle school education and those of group C were graduates (Figure 2). The results indicated that the women could take up occupations depending upon their level of education. However the chi-square test performed to show the association between the level of education and occupation performed was not valid as a result of four empty cells. In general, the primary level workers were mostly illiterate and similar observation has been reported by Anbu (1987) among the weavers in Trichy District.

Among the construction workers, their education and skill levels were very low and they were forced to do monotonous, strenuous, back-breaking work, at very low wages. In a study of 344 women in Delhi, most of the respondents who were illiterate and engaged in manual work had incomes insufficient to maintain their families. Thirty five per cent earned less than Rs. 1000 a month (Babu, 1989).



DISTRIBUTION OF WORKING WOMEN ACCORDING TO THEIR LEVEL OF EDUCATION
FIGURE 2

d. Family type and size

Three types of families characterise the Indian society-nuclear (consisting of husband, wife and children only), joint (consisting of more than two married couples and their children) and extended families (consisting of one or more than one married couple with their unmarried brothers and sisters).

It was noted that around 70 per cent of families in all the three groups studied were nuclear families and the rest of them were joint families.

Belavady (1980) found that in the urban groups, 52-64 per cent of the families were nuclear while it was 35 per cent in rural areas. In a study of women weavers of Trichy, the majority of the sample (70 %) were from nuclear family set up while 20 per cent had a joint family set up and 10 per cent of the sample belonged to the extended family type (Anbu, 1987). The findings in the present study were found to be similar to the reports of other studies.

The general trend of disintegration of joint family system was reflected in the three groups of families studied. Among the three groups studied, majority (63, 54 and 54.5 % in groups A, B and C) were medium sized families with four to six members. The concept of small family was favoured by about 37 per cent of groups B and C. The mean

family size of groups A, B and C were 6.0 ± 2.1 ; 4.8 ± 2.1 ; and 4.9 ± 1.6 respectively.

2. Economic profile of the working women

The economic profile of the working women included the mean family and individual incomes, sex-based income bias, per cent contribution of working women to total family income and expenditure pattern.

a. Family income

Table II and Figure 3 provide the mean monthly income of the families.

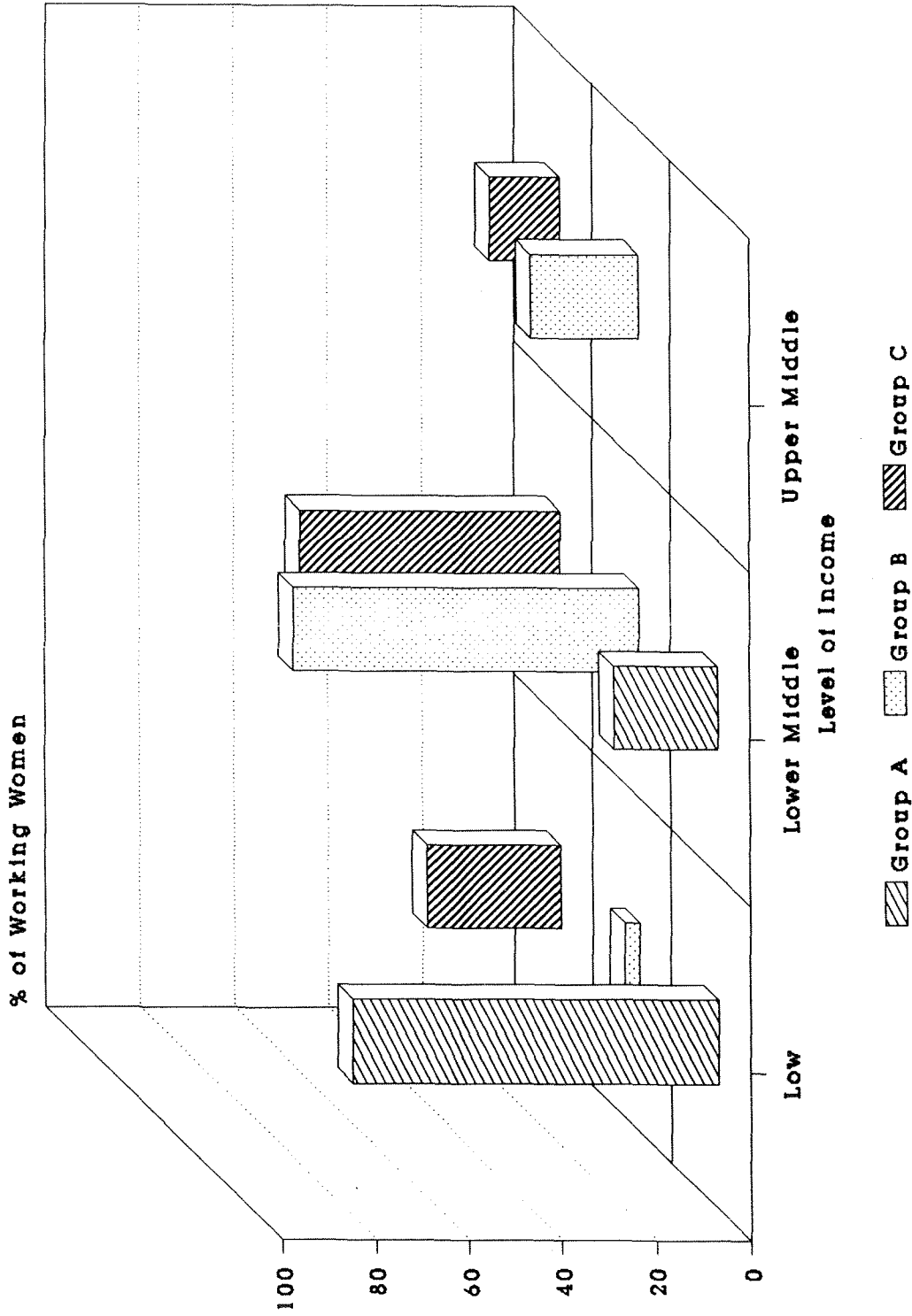
TABLE II
MEAN MONTHLY INCOME OF THE FAMILIES

S.No.	Income category	Average monthly income in Rs.			Mean + SD
		Group A	Group B	Group C	
(n=200 per group)					
1.	Low income (\leq Rs.2000/-)	1272.24 +317.15 (155)	1970.00 +67.08 (5)	1518.39 +344.43 (59)	1354.48 +351.38 (219)
2.	Lower middle Income (Rs.2001- 5000/-)	2467.00 +444.07 (45)	3789.32 +676.81 (147)	3191.03 +344.43 (112)	3373.16 +831.20 (304)
3.	Upper middle Income (Rs. 5000-10,000/-)	- (0)	6306.35 +1290.04 (48)	6721.38 +2342.47 (29)	6462.66 +1758.33 (77)

	Mean	1541.06	4347.92	3209.50	3032.83
	+ SD	+345.71	+823.84	+878.48	+1840.53

χ^2 value=256.69; Significant at one per cent level

Note: Values in parenthesis indicate number of women in each subclass.



DISTRIBUTION OF WORKING WOMEN ACCORDING TO THEIR INCOME
FIGURE 3

The mean family income of the entire population was Rs. 3032.83±1840.53. The mean family income of groups A, B and C were Rs. 1541.06±345.71; 4347.92±823.84 and 3209.50±878.48 respectively. The mean income of the low, lower middle and upper middle income groups were Rs. 1354.48±351.38, 3373.16±831.20 and 6462.66±1758.33 respectively.

It was observed that the majority of the families in groups A, B and C, constituted of low and lower middle income groups. In group A, none of the families belonged to upper middle or higher income categories and the group B workers seemed to be better paid than those in groups C and A. The association between the family income and the type of occupation seemed to be significant at one per cent level ($\chi^2=256.69$).

b. Income bias

In the present study, it was observed that women of group A, doing construction work were paid Rs. 35 to Rs. 45 per day, in contrast to a minimum of Rs. 60 per day, paid to men doing the same work. Similarly, most of group, B women workers engaged in spinning/winding of cotton yarn, were paid Rs. 1600 to Rs. 1800 per month while their male counterparts were paid Rs. 2000 to Rs. 2200 per month.

Sivaraman (1992) supports the fact that there exists a wide prevalence of unequal wages between men and women, even in areas where there is a high degree of urbanisation. Sahu and Das (1992) also report that women at roadsides and construction sites, breaking stones and lifting equal loads as men are paid only half the pay received by men.

c. Contribution of working women to their total family income

Table III presents the per cent of the total family income contributed by the earnings of the subjects studied.

TABLE III
PER CENT CONTRIBUTION OF WORKING WOMEN TO THE TOTAL FAMILY INCOME

Group (n=200/ group)	Mean income of women (Rs./mo.)	Mean family income (Rs./mo.)	Contribution of women to family income (%)
A	563.45+135.49	1541.06+345.71	36.56
B	2028.66+266.58	4347.92+823.84	46.66
C	970.73+321.44	3209.50+878.48	30.25
Mean + SD	1187.61+437.51	3032.83+1840.53	37.82

In the present study, working women contributed to nearly 40 per cent of the total family income (36.56, 46.66 and 30.25 per cent by women of groups A, B and C

respectively). Families with both husband and wife, earning are multiplying, more so in big cities. And there is every indication that this trend will accelerate with time. The second income is pooled with the first and is used chiefly for household expenditure (Singh, 1991).

A study by the Operations Research Group (ORG) and Indian Council of Medical Research (ICMR) (Khan et al., 1992) on 800 married women from 114 slums of Baroda city reiterated the fact that the contribution of working women to family income was crucial for family survival. About half of the women were contributing 25-50 per cent of the total household income, while nine per cent were bearing the total economic burden of the family. The results of the present study are in line with the observations made in this investigation.

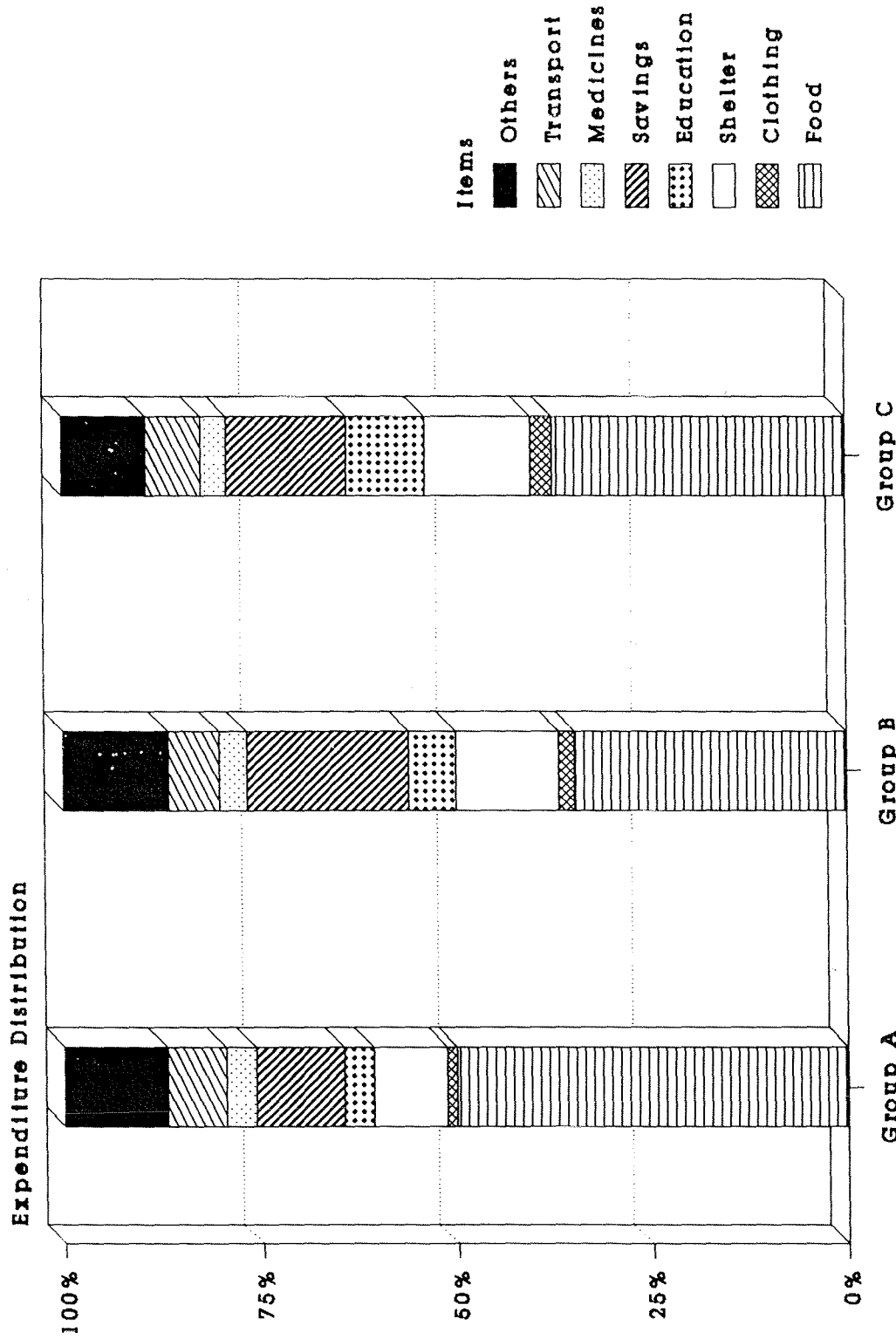
d. Expenditure pattern of the families

Table IV and Figure 4 present the expenditure pattern of the families studied.

TABLE IV
EXPENDITURE PATTERN OF THE FAMILIES

S. No.	Items	% expenditure in groups		
		A	B	C
a.	Food	50.1	34.9	37.7
b.	Clothing	1.3	2.0	2.7
c.	Shelter	9.4	13.3	13.6
d.	Education	3.7	5.9	9.9
e.	Savings/Remittance	11.3	20.7	15.3
f.	Medicines	3.8	3.5	3.2
g.	Transport	7.4	6.4	7.1
h.	Fuel	4.6	3.5	4.3
i.	Others	8.4	9.8	6.2
Per capita expenditure on (Rs./mo.)				
i.	Food	129.14	309.81	229.33
ii.	Health	9.86	29.82	20.99

In all the three groups of families, food was found to take the major portion of their expenditure, being 50.1, 34.9 and 37.7 per cent in groups A, B and C respectively. The lowest income group spent the largest proportion of their earnings on food. When the per capita food expenditure was computed it was found that Rs. 129.14; 309.81; and 229.33 were spent by groups A, B and C respectively. In group A, even though the proportion spent was more, the per capita expenditure was the lowest and this might be due to lower income as well as bigger family size in group A. Next to food, all the families spent on savings/remittance and shelter. Since all were urban dwellers, the pattern of



EXPENDITURE PATTERN OF THE FAMILIES
OF THE WORKING WOMEN
FIGURE 4

expenditure was similar among all the groups. When the per capita monthly expenditure on health was considered, the subjects in groups A, B and C spent Rs. 9.86, 29.82 and 20.99 respectively. The lowest expenditure among group A subjects might be due to their inability to spend, ignoring their health care and due to availing of medical facilities in Government hospitals. Also the expenditure on education was the lowest in group A (3.7 %) and highest in group C (9.9 %). The subjects who were most literate appeared to spend more towards the education of their children.

Surveys of the National Institution of Nutrition (NIN, 1989) indicate that major proportion of the income of an average Indian is spent on food. A rural Indian spends relatively more on food (64 %), fuel and light (7 %) as compared to his urban counterpart (57 and 7 % respectively). The urban Indian spends more on non-food items like housing and clothing (10 %) and other expenditure (24 %), while the rural Indian spends less (8 and 18 % respectively). In a study on 60 farm households, the share of expenditure on foods stuffs was found to be 72.14 per cent (Wadkar, 1988).

Chandra and Lakshmiswaramma (1991) in a six-state study found that, greater than 65 per cent of industrial workers, government staff and school teachers incurred upto two rupees per day to reach work place. In the present study,

since all were working women, 6.4 to 7.4 per cent of the total income was being spent on transport alone.

3. Personal habits of the working women

Table V provides the details regarding the personal habits of the working women.

TABLE V
PERSONAL HABITS OF THE WORKING WOMEN

		(n=200/group)		
S.No.	Personal habits	Per cent of women		
		Group A	Group B	Group C
1. Alcohol consumption				
	- Daily	1.5	0	0
	- Frequently (Weekly)	4.0	2.0	0
	- Rarely (Fortnightly)	26.0	5.0	2.0
	- Never	68.5	93.0	98.0
	Years of consumption (Mean)	7.84 +3.45	3.11 +1.63	2.20 +1.04
	Mean amount consumed (ml/day)	100ml	60ml	25ml
2. Tobacco smoking/chewing with betel leaf				
	- Daily	44.0	33.0	0
	- Frequently	24.0	27.5	1.5
	- Rarely	9.5	11.0	4.0
	- Never	22.5	28.5	94.5
	Years of consumption (Mean)	16.12 +4.63	9.42 +3.14	5.68 +2.73
	Mean quantity used/day	6 betel leaves + 2 wads of tobacco	3-4 betel leaves + 1 wad of tobacco	1-2 betel leaves

Serving betel leaves commonly known as 'paan' after a heavy meal as a mouth freshener, is an Indian tradition, synonymous with hospitality and culture. Among the Hindus and Muslims, no ritual is complete from birth to death, without betel leaves.

In the present study, 44 and 33 per cent of women in groups A and B were in the habit of daily chewing tobacco leaves along with betel leaves and arecanuts with lime paste. Further 24 and 27.5 per cent of these groups chewed tobacco frequently. This was attributed to relieving fatigue, improving work performance and also as a social practice/custom. Goel et al. (1994) reported that the benefits of tobacco smoking/chewing, as opined by smokers ranged widely from the facilitation of social interaction, to the reduction of work tension. Majority of group C women (94.5 %) abstained from tobacco chewing but they did consume betel leaves, to aid in digestion after heavy meals and not on duty due to the white-collar nature of work and personal preference. Nine per cent of group A women also smoked tobacco in the form of 'beedis' (crude, country cigarettes). More number of working women of groups A and B were in the habit of chewing tobacco with betel leaves over longer periods of time. Similarly Devadas (1988) and Kaur and Sood (1988) have reported that chewing of betel leaves and

consumption of other stimulants was a common practice among workers.

Majority of the women of groups B and C (98 %) and to a lesser extent group A (68.87 %) abstained from consumption of alcohol. But more than one-fourth of group A women workers consumed about 100 ml arrack/toddy (ie., country liquor) once a fortnight. The reasons stated for consumption were - to overcome work fatigue and stress; to temporarily forget their burdens of daily life; and as husband/peers consumed alcohol for pleasure and relief. Two per cent of women in group C, consumed small amounts (5-10 ml) of distilled liquors like wine during weddings and festivals.

Basker (1994) suggested that employment status significantly predicted frequency of alcohol consumption among women. Statistics reveal that 50 per cent of lower class women smoke compared with only some 16 per cent in the professional classes. This is partly because of health education which is better understood by educated population. Ahlborg and Bodin (1991), in a study conducted among pregnant Swedish women found that active smoking was common among industrial workers and those in service occupations, but rare among well-educated women such as teachers and nurses.

4. Living surroundings

Table VI gives data on the living surroundings of the families of the working women.

TABLE VI
LIVING SURROUNDINGS OF THE WORKING WOMEN

(n=200/group)				
S. No.	Home environment	Group A (%)	Group B (%)	Group C (%)
1.	Noisy with heavy traffic	76.0	30.5	33.5
2.	Congested industrial area	15.0	21.0	13.0
3.	Peaceful and clean	9.0	48.5	53.5

About three-fourths of group A women lived in urban slums, which were noisy, congested with heavy vehicular traffic. More than 30 per cent of group B women lived in noisy areas, while 21 per cent lived in congested industrial areas, surrounded by small foundries and textile factories. Nearly half of group B and C workers lived in relatively clean and peaceful residential areas. Inflated house rents and relatively low wages were cited as the main reasons for living in urban slums/congested and poor home surroundings.

The 1991 Census of India has estimated that about 20 per cent of the urban population lives in slums. Crowding in dwellings and noise from industries, railroads and motor

traffic are all potential health hazards (Mukherjee, 1991). In a study of the construction workers, Radha and Palanisamy (1992) also noticed that their living conditions were in no way better than their working conditions. They lived in houses with no proper provision for safe drinking water, toilet and drainage facilities.

B. Occupational Profile of Working Women

The occupational profile of the selected working women (n=600) deals with the flow charts of their activities, work profile, work pattern and time disposition, reasons for employment, problems encountered at work, work conditions and facilities, crowding at work sites, survey of OHS personnel and participation of working women and family members in household activities.

1. Activities performed by the three occupational groups

The various tasks performed by group A women at construction sites included non-specific, low-skill and low-paying tasks like sifting sand, carrying bricks, water and mortar, rough plastering of walls, etc., which required heavy manual effort (Fig. 5). Highly paid tasks requiring specific skills like masonry, plumbing etc., were performed mainly by men.

FIGURE 5
FLOWCHART OF ACTIVITIES OF CONSTRUCTION WORKERS

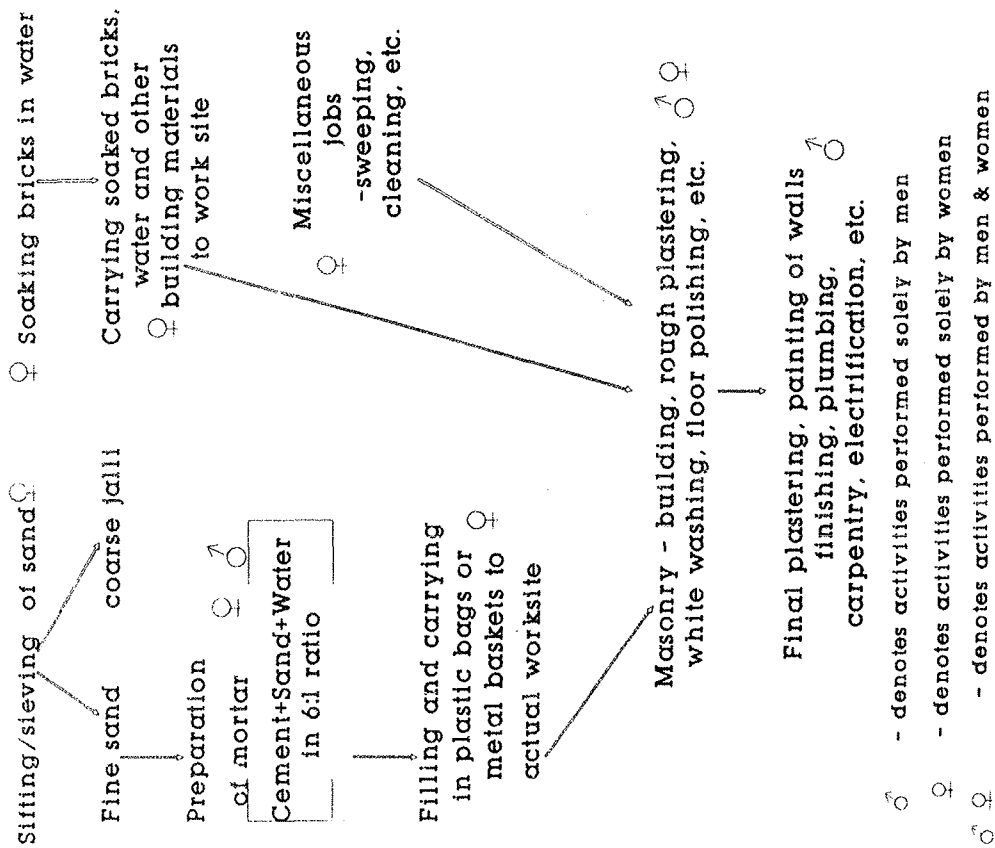
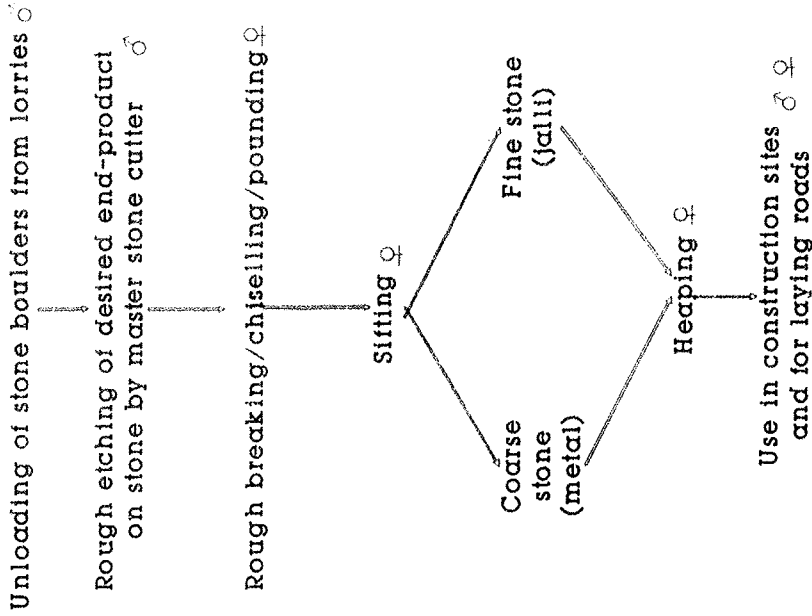


FIGURE 6
FLOWCHART OF ACTIVITIES OF STONE CUTTERS



♂ - denotes activities performed solely by men

♀ - denotes activities performed solely by women

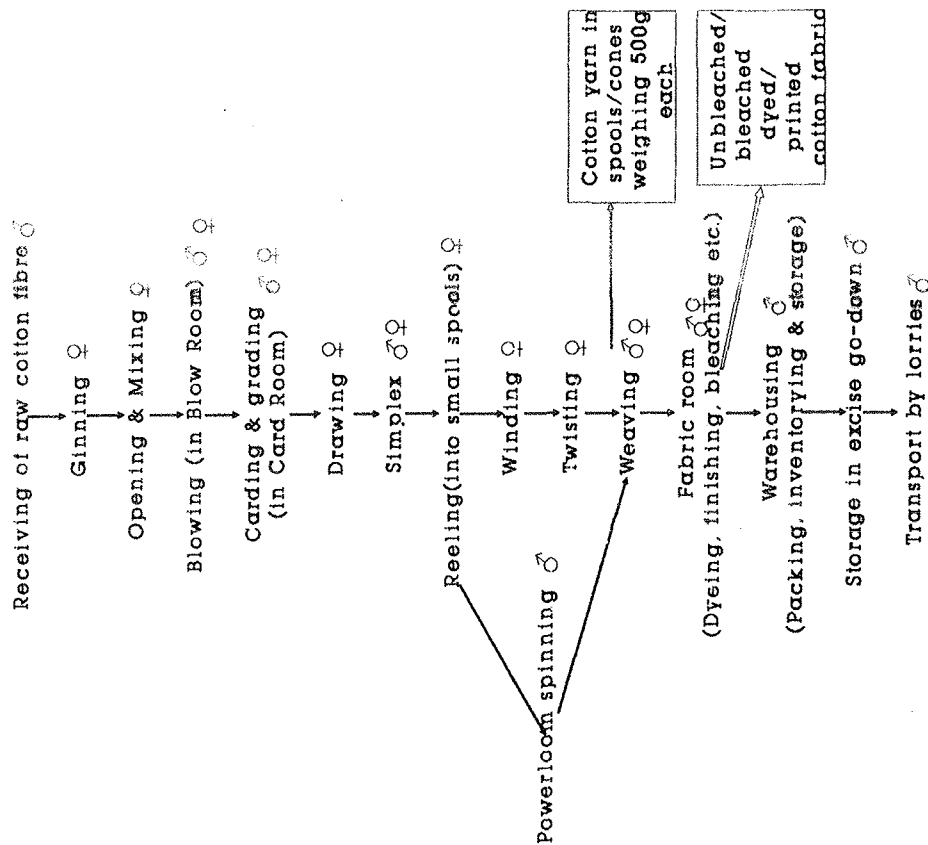
♂ ♀ - denotes activities performed by men & women

The same bias allotment in work tasks was observed among women workers at stone quarries where they were partly involved in rough breaking of stones into coarse stone chips - "jalli", used in the preparation of mortar and reinforced concrete (Fig. 5 and 6). As regards the methods and procedures of stone breaking they adopted similar procedures everywhere. The instruments used were very simple - hammers of different sizes, rubber rings or strips, crowbars and a stone base or platform. The lightest hammer (weighing half a kilo) was used for preparing the 'metals'. Plates V to IX depict the activities performed by the women of group A.

Sahu and Das (1992) reported that five per cent of the workers' earnings was forcibly collected by middlemen. Women were paid Rs.1.80 per tin of chips unlike Rs.2.50 per tin paid to men.

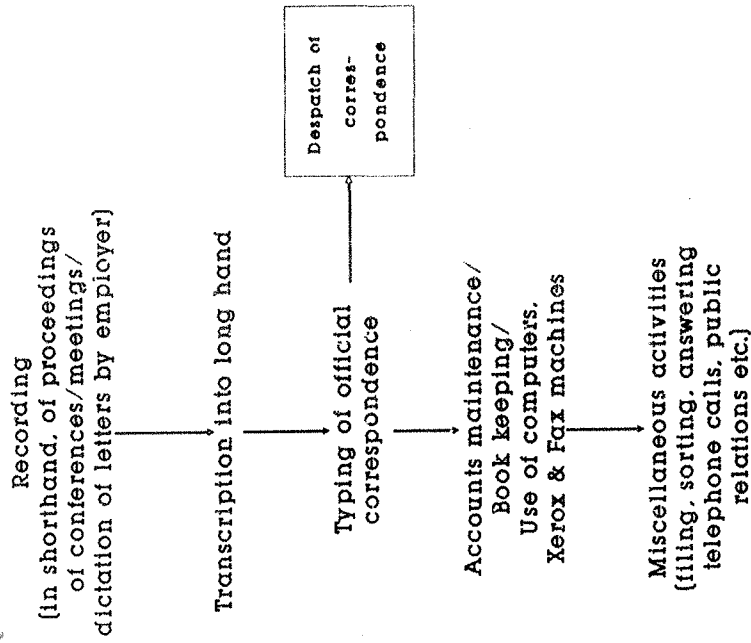
Figure 7 clearly depicts that textile workers were semi-skilled, performing repetitive tasks requiring constant concentration. Powerloom and mechanical-spinning/winding of cotton into spools of yarn, is a labour intensive job. Ginning, twisting and dyeing were other tasks performed by women; while weaving, finishing, packaging, inventorying, storage and supervisory tasks were performed by men (Plates X to XIII).

FIGURE 7
FLOWCHART OF ACTIVITIES OF TEXTILE WORKERS



♂ - denotes activities performed solely by men
 ♀ - denotes activities performed solely by women
 ♂ ♀ - denotes activities performed by men & women

FIGURE 8
FLOWCHART OF ACTIVITIES OF CLERICAL STAFF



Note: All activities performed by women



Plate V.



Plate VI.

Plate VII.



Plate VIII.



Plate IX.

Plate V to IX.

ACTIVITIES PERFORMED BY GROUP A SUBJECTS



Plate X.



Plate XI.



Plate XII.



Plate XIII.



Plate XIV.

Plate X to XIII: ACTIVITIES PERFORMED BY GROUP B SUBJECTS

Plate XIV: GROUP C SUBJECTS AT WORK

Group C women-stenographers/typists were involved in a variety of tasks varying from the use of typewriters and computers to accounting and public relations (Fig. 8 and Plate XIV).

2. Work profile of the subjects

Table VII provides details regarding work profile of the subjects studied.

TABLE VII
WORK PROFILE OF THE SUBJECTS

		(n=200/group)		
S.No.	Work profile	Percentage of women		
		Group A	Group B	Group C
1. Nature of job				
	a. Organised	0	100	69
	b. Unorganised	100	0	31
2. Years of work experience				
	a. 0 - 5	7.5	4.0	18.5
	b. 6 - 10	15.0	38.0	61.5
	c. 11 - 15	64.0	41.5	13.0
	d. 16 and above	13.5	16.5	7.0
	Mean	12.2	11.4	10.4
	(yrs & mo.)	+6.9	+5.4	+4.8

Construction work was totally unorganised, seasonal, temporary and migratory in nature. On an average, workers of groups A, B and C had 12.2, 11.4 and 10.4 years of work

experience respectively. The proportion of urban women employed as casual wage labourers has increased from 23.71 to 27.27 per cent during 1973-83, indicating 'casualisation' of female labour. This is disturbing because it shows that the increments to the urban female work force are being absorbed in low-paid jobs which lack contractual obligations bringing more women into the vortex of insecurity and poverty (Bennett, 1988 and Parthasarathy, 1994).

The actual work performance of all the workers was measured by the investigator in co-operation with their supervisors and personnel managers to avoid exaggeration, inaccuracy and ambiguity. Average number of bricks carried per day, number of spools of yarn produced per day and the number of words typed per minute and the mistakes committed were used as criteria to evaluate the work performance of the three groups studied. An average of three observations was taken as the final value.

It was observed that the women in group A carried seven to eight bricks on their heads at a time, each brick weighing 3 to 3.1 kg. Each worker carried half a bag of "jalli" or "mortar mixture" or a metal basket of mortar, weighing 12.5 kg and 13 kg respectively. On a normal day at work, she carried an average number of 141 bricks per day.

At the textile mills, the number of reels (ie., cones) of 50 to 80 count cotton yarn that were wound mechanically, was used as the measure for assessing the work performance of women in group B. On an average, a textile worker produced 37 reels of cotton yarn per day; each reel weighing half a kilogram. Unlike groups A and B, the work performance of group C workers ie., stenographers/typists, was assessed, in terms of speed and accuracy of typing. The subjects were given a common passage, which they were required to type at the rate of 41 words/minute, within 10 minutes, without any errors. As the time required for typing and number of mistakes increased, their scores (in percentages) were reduced. When more than 25 mistakes were committed, only a "pass mark" of 40 per cent was awarded. On an average, this group scored 80 percent, committing only four to six errors.

3. Pattern and time disposition of working women

The "activity approach" used by Khan et al. (1992) was used to collect time-use data, by which the amount of time spent on different activities in a day was estimated for all the subjects.

Table VIII represents the average time disposition of working women.

TABLE VIII

WORK PATTERN AND TIME DISPOSITION OF WORKING WOMEN

(n = 200/group)

S.No.	Activities	Average time in hours & minutes			't' values for groups compared		
		Group A	Group B	Group C	A vs B	B vs C	A vs C
1.	Economic	11.18 +2.46	9.28 +2.46	7.27 +0.18	6.69**	10.25**	19.92**
2.	Household	4.05 +1.33	4.07 +1.02	3.50 +0.47	0.25NS	3.09**	2.04*
3.	Residual	2.15 +0.37	3.52 +0.52	5.25 +0.21	21.50**	23.45**	63.16**
4.	Sleep	6.22 +0.31	6.33 +0.48	7.18 +0.36	2.72**	10.61**	16.67**

Key : ** - Significant at one per cent level

* - Significant at five per cent level

NS - Not significant

The day's activities were divided into economic activities (ie., time spent in active work/per shift or work duration, and overtime), household activities (ie., cooking, cleaning, washing clothes etc.), residual activities (time spent in leisure, recreational activities like watching T.V., child and personal care) and sleep (at night).

Group A workers spent the maximum hours at work (11.18 ± 2.43 hrs and mts.) followed by group B (9.28 ± 2.46 hrs and mts.) and group C (7.27 ± 0.18 hrs and mts.). The differences observed between the groups were statistically significant at one per cent level, except for time spent in household activities by groups A and B, which were similar. Group C women spent more time in leisure activities, than those in groups A and B.

Babu (1989) reported that only 39.9 per cent of 334 working women in Delhi, spent a maximum of three hours looking after children. Most of the women left their residence at 7 a.m. and returned after 6 p.m. after finishing their work in three to four houses, where they worked as maid servants. Phyllis (1991) reported that women working in salt-pans hardly had any leisure time as they worked for more than nine hours.

Results of a study by Chandra and Lakshmiswaramma (1991) indicated that among 750 working women, 90.8 per cent of teachers worked for six hours, whereas 82.9 per cent of industrial workers, 90 per cent of government servants, 56 per cent and 44 of construction workers worked for eight and nine hours outside their homes.

Khan et al. (1992) found the work pattern of working women and housewives to be quite similar. Women who participated in income generating activities continued to carry out their household chores and as a result spent more time on work than did housewives. The average daily time disposition of working women was around 11 hours and 36 minutes as against 9 hours and 9 minutes for housewives.

4. Reasons for employment

Table IX provides the reasons for employment as expressed by the selected women.

TABLE IX
REASONS FOR EMPLOYMENT

		(n=200/group)		
S.No.	Reasons for employment	Percentage of women		
		Group A	Group B	Group C
For:				
1.	Economic reasons	93.0	43.5	81.5
2.	Augmenting family income	65.0	61.0	39.5
3.	Social recognition	24.5	65.5	69.0
4.	Personal satisfaction	8.0	46.0	65.5
5.	Others	21.0	27.0	24.5

Economic necessity (93 %) and the need to augment family income (65 %) were the chief reasons for entering the work arena, as voiced by group A women; while the need to facilitate personal improvement was cited by only eight per cent of the women. In other words, they expressed that, if given a choice, they would opt to stay away from work and be involved in household activities.

Contrarily, group B women expressed that the need for better social recognition (65.5 %) and to augment their family income (61 %), motivated them to enter into remunerative employment. A sense of fulfilment and personal improvement as a result of doing constructive work and promotion in job rank were voiced by 46 per cent of the women.

Economic reasons (81.5 %), better social standing (69 %) and personal improvement (65.5 %) were the advantages of employment stated by group C women. The other advantages stated include capacity to purchase luxury goods, invest and save for their future and spend on holidays and recreational activities.

In a study on 50 women weavers, the reasons unanimously quoted for taking up weaving as an occupation were economic necessity and escape from household work. Similar reports

were also made by Anbu (1987) and Mascarenhas (1988) in their studies on urban mothers. Garg (1988) in a study on 100 urban middle class working women reported that economic necessity (25 %), increase in their family income (40 %), using education and leisure fruitfully (23 %) and economic independence (12 %) were the socio - psychological factors that motivated them to seek gainful employment. Majority of the husbands (70 %) either wanted or atleast did not mind their wives taking up jobs.

5. Problems at work

The problems arising as a result of employment are presented in Table X.

TABLE X
PROBLEMS AT WORK

(n=200/group)

S.No.	Problems at work	Percentage of women		
		Group A	Group B	Group C
1.	No problems	2.0	17.5	38.5
2.	Problems			
a.	Job monotony	70.5	40.5	29.5
b.	High production target	70.5	36.5	27.0
c.	Strenuous effort	89.5	16.5	4.0
d.	Insufficient time for household activities	36.5	21.0	28.5
e.	Sustained concentration/specific skill demands	8.0	37.0	39.5
f.	Poor health and accidents	34.5	39.5	4.0
g.	No scope for personal improvement	38.5	17.0	18.0
h.	Socio-cultural problems	14.5	5.5	11.0
Mean no.of problems/group		83.22 +50.78	48.44 +29.22	36.11 +27.53
Mean number of problems voiced/person		3.75 +4.82	2.18 +2.76	1.73 +2.13

Nearly 40 per cent of the women of group C reported that their jobs were devoid of any problems, while only 17.5 and two per cent of groups B and A respectively stated the same. Correspondingly, the mean number of problems voiced by the subjects of group C was the least (1.73 ± 2.13), while the problems faced by groups B (2.18 ± 2.76) and A (3.75 ± 4.82) were considerably more.

Strenuous muscular effort that was necessary in construction work (89.5 %) and repetitive manual tasks (70.5 %) were the major complaints of group A workers. Stress due to high production targets (47.5 %), no scope for personal improvement i.e., job betterment (38.5 %), inadequate time and energy for adequate child and personal care and home management (36.5 %), poor health and high rate of accidents due to poor job facilities (34.5 %) were the other problems faced by them.

All the above problems were also expressed by the subjects of group B. However except the problems such as need for sustained concentration and high rate of accidents, all the problems were voiced by fewer number of subjects when compared to group A.

In the case of group C 40 per cent of subjects stated that their job required sustained concentration and specific skills.

The basic problems that women face, are that they work at the cost of their children's welfare and happy home. For a large group of women workers, creches and domestic help are too expensive (Thimmayamma et al., 1980 and Srivastava, 1983). In the present study also 36.5, 21 and 28.5 per cent of women expressed this problem.

6a. Work conditions and facilities provided at work spots

Table XI provides details, regarding the work conditions and facilities provided at the different workspots.

TABLE XI

WORK CONDITIONS AND FACILITIES PROVIDED AT WORK SPOTS

(n=200/group)

S.No.	Work conditions/ facilities	No. stating 'yes'		
		Group A	Group B	Group C
1. Work Conditions				
a.	Protection from extreme heat and solar radiation	12	179	182
b.	Adequate ventilation	6	187	182
c.	Adequate lighting	63	43	176
d.	Sound insulation	0	153	194
e.	Clean work place	0	0	200
f.	Comfortable work space	4	152	187
g.	Sanitary waste disposal	0	136	200
h.	Absence of strain	0	43	200
i.	Provision for use of protective equipment	0	11	0
2. OHS (Occupational Health Services)				
a.	First aid centre/ESI/mediclaim facilities	0	126	0
b.	Medical leave with full salary	0	93	24
c.	Primary and maternity health centre/creche for children	0	21	0
d.	Adequate water supply	8	68	184
e.	Non-profit canteen	0	114	0
f.	Toilets and restrooms	5	94	200
g.	Job security/salary increments	0	185	138
h.	Transport facilities	11	0	102
i.	Others	0	188	0

Gross neglect of work conditions and OHS, of group A workers was glaringly evident in Table XI. In most of the textile mills, adequate lighting facilities; protection from heat and solar radiation; sanitary garbage and toxic waste disposal; comfortable work space and equipment and sound insulation by provision of sound absorbing insulation and sound mufflers on spinning equipment, were provided.

The Factories Act of 1976 prescribes facilities that are needed for the welfare of workers whereby the employers must provide washing facilities, facilities for sitting, first-aid appliances, canteen, shelter, rest rooms, lunch rooms and creches where more than 30 women are employed. Mothers are also permitted to visit their children and feed them at necessary hours.

While first-aid centres and ESI (Employees' State Insurance Scheme) facilities and workers' union were present in majority of the textile mills, there were no creches for children and poorly executed post-and pre-natal health care facilities existed. Co-operative food stores, canteens and lunch rooms supplying subsidised food were also present but menu planning was not done in consultation with nutritionists or qualified caterers.

Of the three groups studied, group C women worked in reasonably clean, well ventilated and lit work environments with adequate toilet and drinking water facilities. Some obtained conveyance allowance as part of their pay packets. But they did not enjoy many of the other facilities.

During the course of the study it was observed that most of the workers were unaware of the rights and legal provisions available for them; it is important that health/labour personnel educate workers and management regarding these provisions. Workers must have the right to know, to voice their problems, to participate in implementing welfare and safety measures.

Nag (1994) reports that most of the occupational diseases are preventable, using adequate preventive health services, new technologies and equipment that are formulated based on ergonomic research. Garg (1988) was of the opinion that most private organisations consider maternity benefits as sheer waste of money.

Though construction workers are covered under various Acts like 'The Minimum Wages Act, 1948', 'The Contract Labour (Regulation and Abolition) Act, 1970' etc., there is dissatisfaction with their adequacy, coverage, effectiveness and implementation. Provision of welfare facilities and upgrading the skills of workers may increase their

efficiency. Allowing trade unions and organisations among workers may help protect their rights and prevent exploitation.

The Department of Inspectorate of Factories (1995) and Coimbatore Action Centre of the National Safety Council, stressed the importance of industrial safety - training, as it affected quality, productivity and environment. A study of about 300 reported accidents in one industry had proved that 80 per cent of them were due to lack of training of employees.

Among the three occupational groups only textile workers earning Rs. 1300-3000/- per month were covered by the ESI scheme whereby they received medical treatment from ESI and on issue of medical certificate by an ESI doctor, sick benefits, monetary compensation and medical leave were provided to them (Director General, ESI Corporation, 1989). The ESI Act, envisages the following six benefits - medical, sickness, maternity, disablement, dependants and general benefits.

b. Crowding in different work sites

In Table XII the number of persons per work site/room, floor area of each work site/room and crowding in different work sites are given.

TABLE XII

CROWDING AT DIFFERENT WORK SITES

Group	Work site	Mean No. of workers	Mean floor area (sq.m)	Mean No. of windows	Mean No. of exhaust fans/fans/airconditioner	Mean No. of doors	No. of workers/1000 sq.m	Floor area (sq.m) available/worker
A	Construction site	22	408.33	-	-	-	54	18.56
B	Spinning/weaving room	32	638.51	4	3	3	50	19.95
C	Office	3	20.43	2	2	2	147	6.81

In the present study, an average construction site, spinning/weaving room and an office had a floor area of 408.33, 638.51 and 20.43 sq.m., respectively. In short the floor area available for a worker doing construction labour or spinning was nearly 20 sq.m., while the space available for a clerical worker was 6.81 sq.m.

c. Absenteeism of women workers from work

The number of days away from work during the past year by the subjects and reasons for their absenteeism are presented in Table XIII.

TABLE XIII
ABSENTEEISM FROM WORK DURING THE PAST YEAR

		(n=200/group)		
S.No.	Reasons for absenteeism	Per cent of days absent by		
		Group A	Group B	Group C
1.	Ill health	42.0	63.0	55.0
2.	Illness of family members	15.0	23.5	24.0
3.	Lay-off/adverse climate	31.5	6.0	2.5
4.	Festivals, functions etc.	11.5	7.5	18.5
	Mean number of days away from work/year	54	26	22

Absenteeism is a major factor affecting work productivity and is closely related to a worker's health as well as her personal, domestic and social life. In the five

million strong work force of India working in registered factories, absenteeism has been found to be as high as 15 to 20 per cent.

From Table XIII it is apparent that group A workers were away from work (54 days/year) more often than group B (26 days/year) and group C (22 days /year) workers. It was substantiated by greater risk of falling sick (42 %) and lay-off from work due to strikes and adverse climatic conditions (eg. monsoon rains) (31.5 %) which are crucial for construction work. Health and physiological changes including child bearing of the working mothers, followed by ill health of children and other family members, were contributory factors for absenteeism among groups B and C. To a smaller extent, festivals and other miscellaneous reasons also played a part. In a study by Garg (1988) working women reported that care of pre-school children and sick school going children, was a frequent cause for absenteeism from work.

Though only a small proportion of workers' absenteeism was due to sickness, workers availed of sickness benefits by claiming the same for situations that, in reality were not related to sickness. Brown and Harris (1980) and Sorensen and Verbrugge (1987) reported that women with pre-school children were more likely to take leave from work, for the

purposes such as visiting the doctor and nursing sick children. According to Ghosh (1991), a high degree of mechanisation may increase psychosomatic disorders, reduce job satisfaction and contribute to a higher rate of absenteeism. Hence the solution to the problem of absenteeism lies in dealing with the cause, after thorough investigation of the occupational environment of the workers.

8. Existing Occupational Health Services (OHS)

A check list was administered to 30 managers and health care personnel, to elicit information on the Occupational Health Services (OHS) adhered at their workspots. Table XIV gives a brief account of the findings of the existing OHS.

TABLE XIV
DETAILS REGARDING EXISTING OHS AT WORK SPOTS

(n=30)

S.No.	Criteria/Details	Number stating		
		Group A	Group B	Group C
1.	Training in OHS			
	- Yes	0	3	2
	- No	10	7	8
2.	Reasons for lack of OHS			
	a. Ignorance	8	1	5
	b. Company policy	2	4	3
	c. Financial constraint	2	3	5
	d. Other reasons	4	3	2
3.	In the presence of OHS			
	a. No. of available health personnel	0	8	2
	b. Personnel officers	0	13	5
	c. Presence of premises for rendering OHS	0	4	2
	d. Periodic medical examination	0	9	2
	e. Provision of first-aid education	0	7	0
	f. Periodic supervision of work environment	0	10	6
	g. Curative approach of OHS	0	8	4
	h. Rehabilitative approach of OHS	0	2	1

OHS was a concept that was in general not given any importance by managements and authorities of any group unlike other aspects of employment like production targets. Most of the personnel did not have any form of training in OHS. While personnel of group A were ignorant of the concepts of

OHS, company policy and financial constraint were the reasons stated for lack of OHS among groups B and C.

OHS was absent for group A workers, inspite of workers belonging to well established architectural consultants and construction companies.

There were more number of personnel officers, nurses, first-aid workers in the textile mills (group B) than in offices (group C). Inspite of the existence of canteens/snack-shops with industrial feeding facilities, (group B and C) dieteticians or nutritionists were neither employed nor consulted in planning and preparing nutritious and balanced meals.

NIOSH (1991) and other researchers have highlighted the importance of medical examinations before and during employment, providing supervision of work environment and hazard identification. In most of the textile mills (9), medical examination entailed only pre-employment measurement of height, weight and blood pressure. In a nutshell, the approach of the OHS of groups B and C, was curative (by providing ESI medical facilities) rather than preventive.

9. Participation of working women in household activities

Table XV depicts participation rates of working women in household activities such as child care, cooking, household chores and other duties.

TABLE XV

EXTENT OF PARTICIPATION OF WORKING WOMEN IN HOUSEHOLD ACTIVITIES

S.No.	Household activities	Per cent of working women participating (n=200/group)					
		Group A		Group B		Group C	
		Complete	Partial	Complete	Partial	Complete	Partial
1.	Child care	67	33	43	57	49	51
2.	Cooking	92	8	91	9	96	4
3.	Household chores	77	23	27	73	17	83
4.	Other activities	63	37	50	50	34	66

Majority (90 %) of all the working women were involved in cooking; more women of groups B and C were only partially involved in the other household activities as they had paid helpers, whereas more than 60 per cent women of the group A performed all other duties without the aid of other family members or paid help.

Garg (1990) reported that except for a handful of working women who can afford to hire domestic help, most of them did all the household chores by themselves. For those women, there was neither time, energy nor opportunity to invest in training or self development.

However in recent years, there has been a change in the attitude of husbands towards their working wives as they are now more co-operative and understanding. Surveys conducted by Garg (1990) in Ludhiana and Mukherji (1993) in Madras pointed out that husbands of working women helped in buying grocery, paying electricity bill, dusting furniture, dressing up children for school, serving guests and other responsibilities.

Thimmayamma et al. (1980) in a study among 410 educated urban working mothers, reported that they preferred joint families for better child care, as that responsibility would be shared by in-laws and other relatives better than paid help. Anbu (1987) reported that 60 per cent of women weavers

did not have anybody to look after their children and therefore they had responsibilities before and after work which were found to cause excessive fatigue and sickness.

Women with full responsibility in the home and whose husbands did not contribute to household chores were more depressed than women whose husbands did help, regardless of the women's employment status (Sorensen and Verbrugge, 1987).

C. Food Consumption Habits and Beliefs of Working Women

The food consumption practices including daily meal patterns, foods given during special conditions and illness and consumption of non-alcoholic beverages of the working women are presented below :

1. Daily meal patterns of the selected working women

The meal pattern of the three groups of working women was rice based. Rice gruel in combination with butter milk/pulse preparation (thuvayal or sambar) or and millet gruels were primarily consumed by construction workers (group A). Women of groups B and C occasionally consumed wheat in addition to rice, pulses and vegetables. The consumption of mid morning and tea snacks, malted beverages and non vegetarian foods improved with their income and awareness. Table XVI provides data on the food consumption practice of the subjects studied.

TABLE XVI
FOOD CONSUMPTION PRACTICES OF WORKING WOMEN

(n=200/group)				
S.No.	Food Consumption Practices	Group A %	Group B %	Group C %
1.	Type of diet			
	a. Vegetarian	25.5	25.0	21.5
	b. Non-vegetarian	63.5	61.5	75.0
	c. Vegetarians (consuming egg only)	11.0	13.5	3.5
2.	Meal preference			
	a. Canteen lunch	3.5	27.5	27.0
	b. Tiffin/packed lunch	80.5	68.0	70.0
	c. Going home for lunch	16.0	4.5	3.0
3.	Feeding preference			
	In feeding most importance is given to :			
	a. Husband/head of the family	16.5	20.5	7.0
	b. Self	4.5	5.5	2.5
	c. Children/others	79.0	74.0	90.5
4.	Practice of meal planning			
	a. Yes	17.5	31.0	33.5
	b. No	82.5	69.0	66.5
5.	Daily meal pattern			
	a. Two meals	47.0	0	0
	b. Three meals	53.0	100.0	100.0
6.	Food combination preferred			
	a. Cereals & pulses*	26.0	5.5	2.5
	b. Cereals, pulses* vegetables	57.0	6.5	5.5
	c. Cereals, pulses*, fruits & vegetables	17.0	88.0	92.0

Note : 'Pulses*' includes fleshy foods in the case of non-vegetarians.

Three-fourths of the entire sample were non-vegetarians, chiefly meat and egg consumers. Most of the working women (80 % - group A, 68 % - group B and 70 % - group C) preferred packed "tiffin" lunches. About 27 per cent of groups B and C women preferred to buy coupons for canteen lunches or organised meals, due to subsidised rates and work simplification. While feeding, top priority was given to children in all the three groups, followed by the head of the family.

An improvement in educational status and a better understanding of time management led nearly one-third of the textile workers and stenographers to plan their meals ahead of time. They also cited the advantages of menu planning. Nearly all of the group A women followed a two-meal pattern, skipping either breakfast, lunch or dinner. All others followed a three-meal pattern.

Cereal, pulse and vegetable combination was chiefly preferred by group A workers (57 %) while cereals, pulses, non-vegetarian foods, fruits and vegetable combination was favoured by 88 and 92 per cent of subjects in groups B and C respectively.

2. Consumption practices of non-alcoholic beverages

Table XVII gives the consumption practices of non-alcoholic beverages by the working women.

TABLE XVII
CONSUMPTION OF NON-ALCOHOLIC BEVERAGES

(n=200/group)

S.No.	Beverage	Frequency of consumption	Group A %	Group B %	Group C %
1.	Coffee	Daily	98.0	98.5	93.5
		Frequently	2.0	1.5	6.5
	Mean volume consumed		3c	2.5c	1.5c
2.	Tea	Daily	81.5	84.5	86.0
		Frequently	18.5	15.5	14.0
	Mean volume consumed		2c	2c	2c
3.	Aerated beverages	Frequently	1.0	3.5	4.5
		Rarely	11.0	12.5	19.5
		Never	88.0	84.0	76.0
	Mean volume consumed		1/2b	1b	1b
4.	Malted/milk - based beverages	Daily	4.5	33.0	17.0
		Frequently	28.5	52.5	32.0
		Rarely	42.0	12.5	40.5
		Never	25.0	2.0	10.5
	Mean volume consumed		0.5c	1.5c	1c
5.	Fruit juices and other beverages	Frequently	0	2.0	1.5
		Rarely	3.5	8.5	7.0
		Never	96.5	89.5	91.5
	Mean volume consumed		0.5c	1c	1c

Note : 1 cup = 200 ml; 1 bottle = 250 ml

Coffee was the most favoured beverage consumed daily, followed closely by tea, by all the three groups. Beverages like Horlicks, Bournvita, Viva and butter milk were consumed more frequently over aerated beverages and fruit juices, by

groups B and C; and A respectively. Aerated beverages were preferred over fresh fruit juices, because they were believed to aid digestion. Learmouth and Akhtar (1990) reported that in major cities of India, industrial labourers were in the habit of drinking soda (aerated beverage) after a meal. The researchers opined that if the workers spent that money on a banana, guava, or ground nuts rather than a soda, they would get the valuable nutrition they needed.

3. Food habits and beliefs of the working women

Table XVIII provides a list of the foods commonly included and avoided during different stages of life and disease conditions.

TABLE XVIII

FOODS GIVEN DURING SPECIAL CONDITIONS/ILLNESS

S.No.	Special conditions	Foods given	(n=200/group)						
			Group A (%)	Group B (%)	Group C (%)	Foods avoided	Group A (%)	Group B (%)	Group C (%)
1.	Infancy	Breast milk	98.0	81.0	86.0	Adult diet	100.0	100.0	100.0
		Sugar/honey & water	64.5	4.5	12.0				
		Cow's milk	63.0	88.0	74.0				
		Infant foods	2.5	88.0	74.0				
2.	Weaning/pre-school infant	Mashed rice & pulse	96.0	68.0	85.0	Hot and spicy food	87.0	100.0	100.0
		Idli, milk & sugar/bread	87.0	93.5	91.0	Non-vegetarian foods	73.0	-	-
		Soft boiled egg/vegetables	-	77.5	73.0				
3.	Adolescence	All foods	100.0	100.0	100.0	Mango, papaya & ginglyly	85.0	8.0	2.2
		Milk and milk products	7.5	83.0	69.0	Tomatoes	-	3.0	-
		Sweets/egg/ghae & pulse	-	72.0	72.0				
		Cereal-pulse mixtures	-	61.0	22.0				
		Greens	-	47.0	21.0				
4.	Pregnancy	All foods	100.0	100.0	100.0	Papaya	74.0	22.0	21.0
		Milk & milk products	6.0	88.0	77.5	Fruits especially citrus	58.0	-	-
		Egg/chicken/mutton	-	62.0	54.0	Roots & tubers	32.0	4.0	6.0
					Cucumber/greens	16.0	2.0	2.0	
5.	Lactation	All foods	100.0	100.0	100.0				
		Milk & milk products/egg & non-vegetarian foods	81.0	87.0	84.0				
		Native herbs	62.0	32.0	7.0				
		Malted pulse-cereal mixes	-	52.0	77.0				
6.	Old age	All foods	100.0	100.0	100.0	Oily, fried & spicy food	53.0	48.0	39.0
		Beverages	-	21.0	16.0	Hard consistency-foods	36.0	33.0	28.0
					Potato, pumpkin & greens	13.0	27.0	15.0 [∞]	

(Table XVIII Contd...)

S.No.	Special conditions	Foods given	Group A (%)	Group B (%)	Group C (%)	Foods avoided	Group A (%)	Group B (%)	Group C (%)
7. Disease conditions									
a.	Fever/coild/cough	Rice gruel & rasam/ bread/bun/tea/milk Idli & sugar Milk-based beverages beverages	94.0	95.0	96.0	Fruits-citrus, banana, curd	54.0	28.0	16.0
b.	Diarrhoea	Rice gruel Mild tea/beverages	87.5	80.0	83.0				
c.	Jaundice	Rice gruel	36.0	86.0	92.0	Greens/dhals Salt, oil & spices Non-vegetarian foods-egg	44.0	12.0	15.0
d.	Chickenpox	Coconut water/fluids Native herbs	94.0	95.0	96.0		76.0	78.0	83.0
			64.0	55.0	68.0		62.0	38.0	30.0
			56.0	13.0	17.0				

During infancy and pre-school period, breast milk, cow's milk, infant foods like Cerelac, Farex etc., double cooked rice with boiled and mashed pulses and vegetables, were commonly used by the working women to feed their children.

During adolescence, milk, sweets, egg, ghee, pulse mixtures and greens were specially included because of their high nutritive value to meet the physiological stress of growth. But mango, papaya and sesame were avoided because of the belief that they were "hot" foods and increased menstrual flow.

High protein foods like milk and milk products, egg and meats, and cereal-pulse-nuts/oilseed protein supplements along with medicinal native greens and herbs, were the special foods consumed during pregnancy and lactation. Papaya, citrus fruits, roots and tubers, greens and cucumber were foods avoided due to 'abortive', 'cold-producing' and 'gaseous' nature of these foods. Similar information on food fads of pregnant and lactating women was provided by Learmouth and Akhtar (1990) and Jayanthi (1993).

During old age, all foods were consumed, except, oily, spicy, 'hard-to-bite' foods, roots and tubers, according to their individual preferences.

Immense harm occurs due to misconception of food. The low-income family in India spends 70 per cent of it's income on food. If that family avoids nutritious and inexpensive foods like greens, it goes without the nutrition it needs.

Group A women breast fed their children for longer periods due to cultural practices and the practice of carrying infants to worksite. Group B women returned to work soon after child birth due to work pressure. Infants and pre-school children were predominantly fed the traditional rice-based diet. Among the three groups, during periods of physiological stress and growth like adolescence, pregnancy and lactation, changes in choice of foods and dietary intake were not obvious among group A families, due to economic constraint, lack of basic health and nutrition education and deep-rooted misconceptions about food. Contrarily, women of groups B and C were better informed and had greater purchasing power to consume more of milk-based products, non-vegetarian foods and protein supplements. An interesting fact observed was that women of group B had higher individual and total family income than group C women and hence, they spent more on food, in order to increase variety and nutritional content of meals. During disease conditions, rice gruel, bread, light tea and milk based beverages were commonly consumed by the three groups, with the belief that light meals aided in easy digestion and quick convalescence.

D. Nutritional Profile of the Working Women

1. Anthropometric parameters

The mean height, weight, mid-arm circumference and triceps skinfold thickness of the working women are given in Table XIX.

TABLE XIX

MEAN ANTHROPOMETRIC MEASUREMENTS OF THE WORKING WOMEN

S.No.	Anthropometric parameters	Group A	Group B	Group C	Total mean (n=200/group)
1.	Height (cm)	153.88 ± 5.72	154.26 ± 4.84	154.11 ± 6.13	154.08 ± 5.56
2.	Weight (kg)	50.41 ± 6.37	55.92 ± 7.97	49.21 ± 6.21	51.85 ± 6.85
3.	Midarm circumference (cm)	23.7 ± 2.41	26.83 ± 3.16	22.76 ± 2.65	24.43 ± 2.74
4.	Triceps skinfold thickness (mm)	14.21 ± 3.15	18.44 ± 4.52	13.82 ± 3.87	15.49 ± 3.85

The mean heights and weights of subjects in groups A, B and C were 153.88 ± 5.72 , 154.26 ± 4.84 and 154.11 ± 6.13 cm and 50.41 ± 6.37 , 55.92 ± 7.97 and 49.21 ± 6.21 kg respectively. The mean mid-arm circumferences and triceps skinfold thickness of groups A, B and C were 23.7 ± 2.41 , 26.83 ± 3.16 and 22.76 ± 2.65 cm; and 14.21 ± 3.15 , 18.44 ± 4.52 and 13.82 ± 3.87 mm respectively.

Studies by Rao (1987) and Joshi (1988) among adults belonging to higher socio-economic strata indicated greater body measurements than their counterparts belonging to lower socio-economic strata. In a comparative study of rural (n=6676) and urban (n=3370) South Indian women, Rao and Samuel (1980) reported their mean heights and weights to be 151.18 and 150.78 cm; and 42.57 and 44.01 kg respectively.

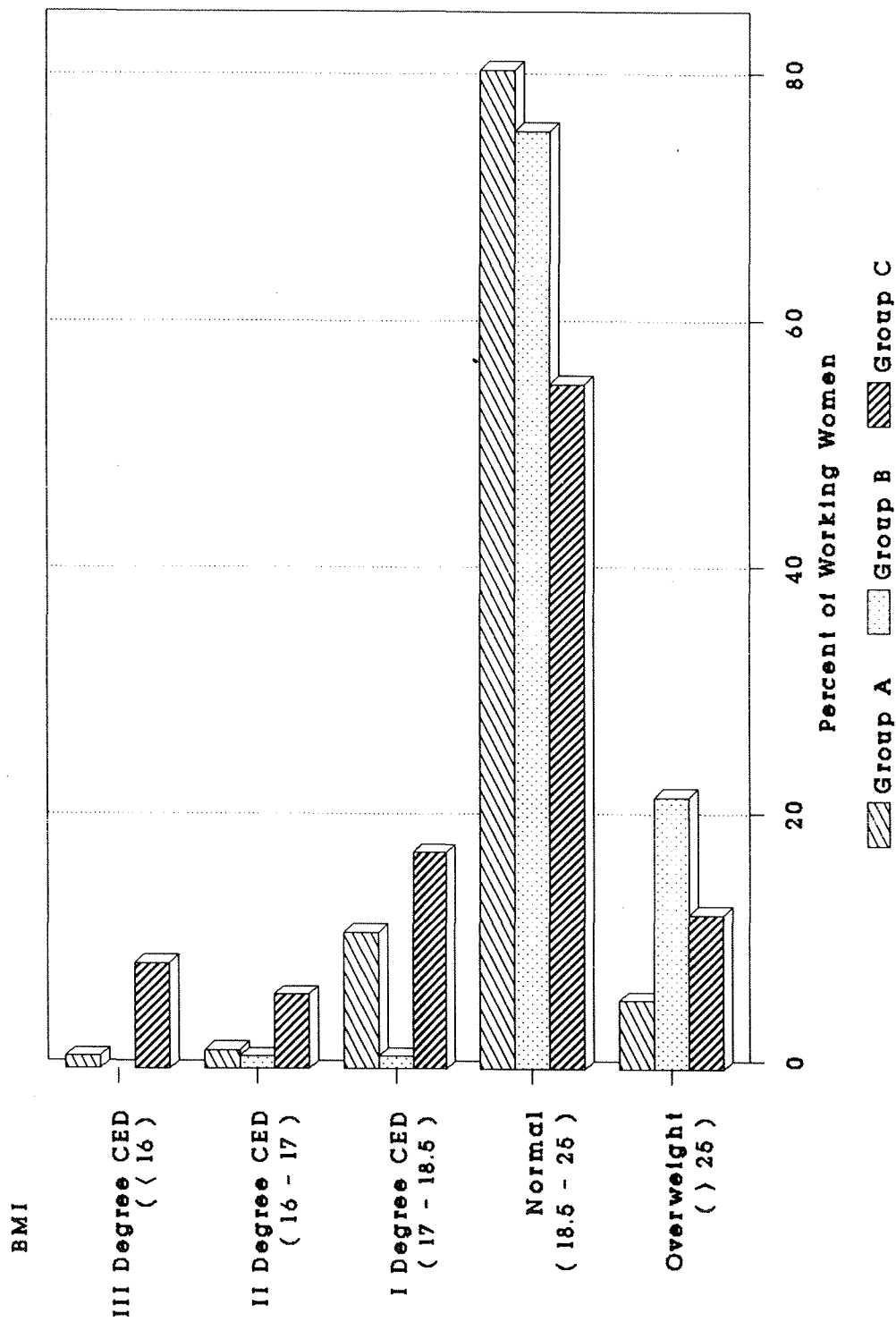
In conclusion, group B women were having optimum height, weight, mid-arm circumference and triceps skinfold thickness, when compared to groups A and C. It may be recalled that the food and nutrient intakes in group B were also satisfactory when compared to the suggested allowances. The entire group of 600 working women had normal body weight of 51.85 ± 6.85 kg, 55 kg being the ideal weight for an average Indian woman (NIN, 1991).

Table XX and Figure 9 classify the women based on their BMI.

TABLE XX
BODY MASS INDICES OF THE WORKING WOMEN

S.No.	Classification	Mean BMI values			Mean
		Group A	Group B	Group C	
1.	Normal (18.5 - 25)	21.57 + 1.50 (162)	22.45 + 1.55 (152)	21.49 + 1.64 (111)	21.87 + 1.61 (425)
2.	Obese/over weight (25 - 30)	26.04 + 0.78 (11)	27.67 + 2.50 (44)	27.20 + 1.41 (25)	27.30 + 2.09 (80)
3.	First degree CED (17-18.5)	17.98 + 0.38 (22)	18.38 + 0.02 (2)	17.76 + 0.42 (35)	17.87 + 0.42 (59)
4.	Second degree CED (16 - 17)	16.64 + 0.33 (3)	16.55 + 0.16 (2)	16.51 + 0.27 (12)	16.54 + 0.26 (17)
5.	Third degree CED (< 16)	15.66 + . 3 8 (2)	- (0)	15.20 + 0.63 (17)	15.25 + 0.62 (19)
Mean		21.29 ± 2.24	23.50 ± 2.93	20.27 ± 3.55	21.84 ± 3.19

Note: Values in parenthesis indicate number of working women in each cell/subclass.
CED : Chronic Energy Deficiency.



CLASSIFICATION OF WORKING WOMEN
BASED ON BMI
FIGURE 9

The entire population of working women had a mean BMI of 21.84 ± 3.19 , which falls within the normal range of 18.5 to 25, as suggested by the National Nutrition Monitoring Bureau (NNMB, 1993). Majority of the women of the three groups (A = 162, B = 152 and C = 111) had normal BMI. Forty four women of group B, 25 and 11 women of groups C and A above 35 years were over weight with a mean BMI of 27.30 ± 2.09 . Satyanarayana (1989) reported that women above 35 years had a tendency to be over weight, especially with desk-bound jobs. A surprising fact of the present study was that 35, 12 and 17 women of group C displayed first, second and third degrees of Chronic Energy Deficiency (CED) respectively. Since both the growth indices - height and weight, were lowest for this group, their BMI also was the lowest. Twenty two, three and two women of group A and only two each of group B exhibited first, second and third degree CED. In general, 9.8 per cent of the entire population exhibited first degree CED and 2.8 and 3.2 per cent exhibited second and third degree CED respectively.

2. Clinical picture

The clinical symptoms related to malnutrition observed among the working women are presented in Table XXI.

TABLE XXI

CLINICAL PICTURE OF THE SUBJECTS

(n=200/group)

S.No.	Organ	Symptoms related to malnutrition	Group A %	Group B %	Group C %	Total %
l.a.	Hair	1. Thinness 2. Easy pluckability	34.5 19.0	13.5 6.0	6.5 4.5	18.2 9.8
b.	Skin & Face	1. Dry, wrinkled skin 2. Pellagrous dermatosis 3. Pallor face	35.0 16.0 46.0	5.5 16.5 33.0	1.5 2.0 30.0	14.0 11.5 36.3
c.	Eyes	1. Xerosis conjunctivae 2. Night blindness	21.0 5.0	11.5 3.5	3.5 1.0	12.0 3.2
d.	Lips	1. Angular stomatitis 2. Cheilosis	10.0 42.0	7.5 39.0	9.0 17.5	8.8 32.8
e.	Tongue	1. Pale & coated 2. Glossitis 3. Red, raw/ulcerated	28.0 5.0 9.0	25.0 0.5 9.0	19.0 1.5 3.0	24.0 2.3 7.0
f.	Teeth	1. Chalky/mottled enamel 2. Dental caries	47.0 46.0	35.0 22.5	27.0 22.5	36.3 32.0
g.	Gums	1. Gingivitis	44.5	21.5	16.0	27.3
h.	Subcutaneous tissue	1. Oedema (feet/body)	5.5	3.5	4.0	4.3
i.	Musculoskeletal	1. Muscular cramps 2. Skeletal deformities 3. Osteoporosis	26.5 12.5 3.0	17.5 4.0 0.5	9.5 3.5 1.0	17.8 6.7 1.5
j.	Neurological changes	1. Paraesthesia	20.5	11.0	12.0	14.5
2.	No symptoms		21.0	38.5	42.5	34.0

About 30 per cent of group A women reported thinness of hair, xerosis of skin, angular scars at the mouth, pale and coated tongue, muscular cramps and weakness and paraesthesia. Discoloured, mottled and chalky enamel and dental caries, bleeding gums, cheilosis and pallor of face were the major clinical signs exhibited by over 40 per cent of women in group A.

Pallor of face, cheilosis, discoloured and mottled enamel of teeth and bleeding gums were the symptoms of nutritional deficiencies exhibited by more than 30 per cent of group B. Pallor of face and cheilosis were the major symptoms exhibited by group C women. Around 21, 38.5 and 42.5 per cent of women in groups A, B and C respectively did not exhibit any signs of malnutrition.

3. Biochemical picture and eosinophil count

The biochemical profile studied in terms of blood haemoglobin, random blood sugar, serum total protein and cholesterol levels and eosinophil count of the working women is discussed below:

a. Prevalence of anaemia among the working women

Prevalence of anaemia, assessed using blood haemoglobin values of the entire population of 600 working women is provided in Table XXII and Figure 10.

TABLE XXII

PREVALENCE OF ANAEMIA AMONG THE WORKING WOMEN

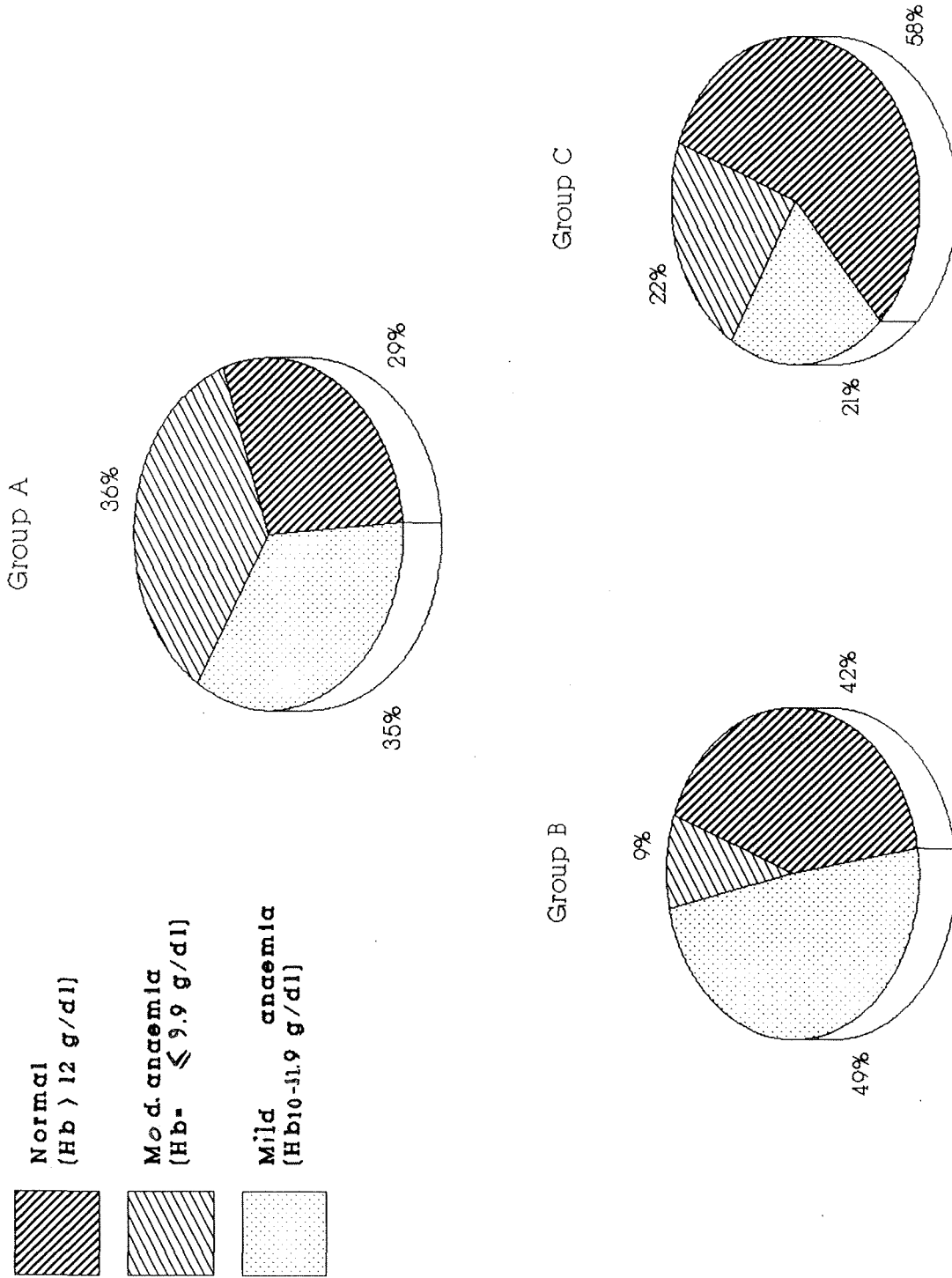
(n=200/group)

S.No.	Degree of anaemia	No. of subjects		
		Group A	Group B	Group C
1.	Normal (≥ 12 g/dl)	59	84	115
2.	Mild anaemia (10-11.9 g/dl)	70	98	41
3.	Moderate anaemia (≤ 10 g/dl)	71	18	44
	Mean haemoglobin value (g/dl)	10.76 ± 1.45	11.50 ± 1.09	11.70 ± 1.68

χ^2 value : 73.307; significant at one per cent level

Of the entire population 43 (n=258), 34.8 (n=209) and 22.2 (n=133) per cent of the women were found to be normal, mildly and moderately anaemic respectively. The population on the whole had a mean haemoglobin value of 11.32 ± 1.48 g/dl which was slightly below the normal value (≥ 12 g/dl) for adult Indian women. When the three groups were compared, more of group B women (n=98) were mildly anaemic, while more of group A (n=71) were moderately anaemic. Group B women (n=18) were less likely to be affected by moderate anaemia than group C (n=44) or group A (n=71).

A significant association at one per cent level was revealed between the three different occupational groups and



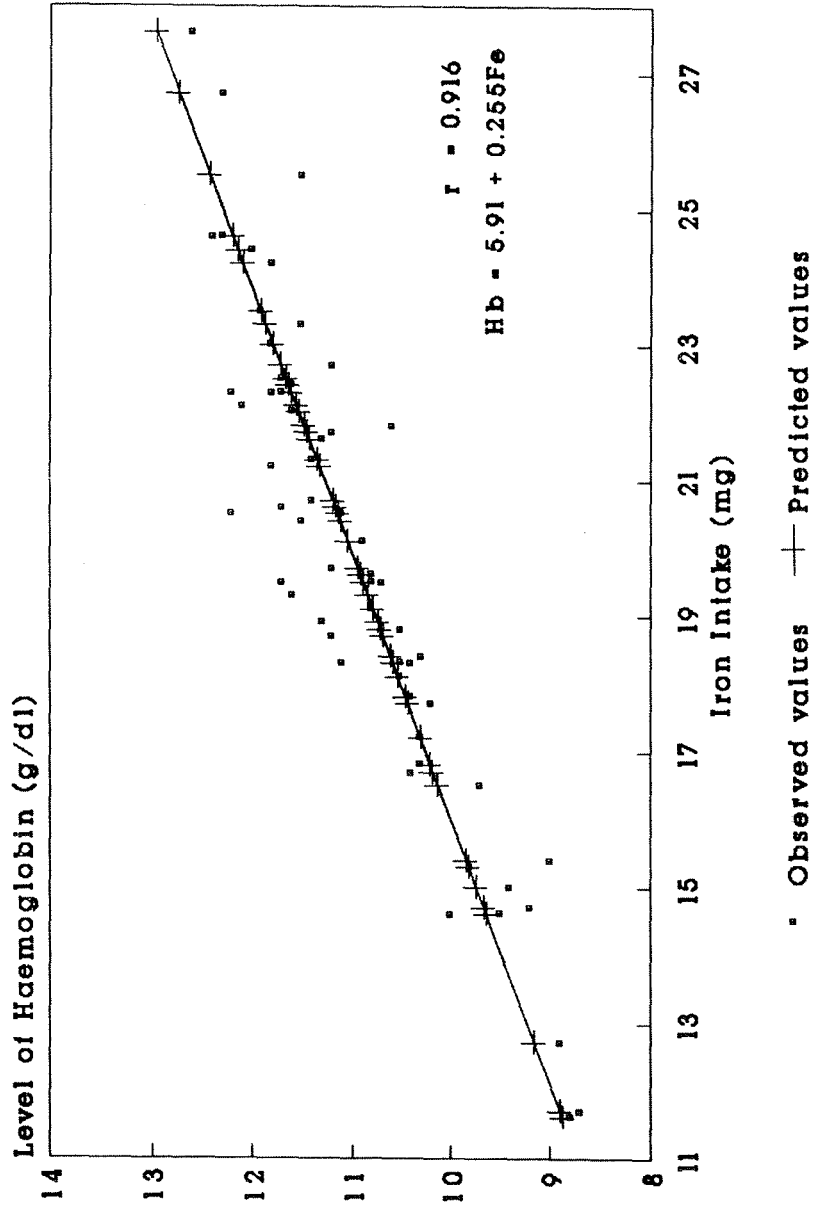
PREVALENCE OF ANAEMIA AMONG THE WORKING WOMEN
FIGURE 10

the degree of anaemia (classified as non-anaemic, mildly anaemic and moderately anaemic groups), the chi-square value being 73.307. Considering the entire population of 600 women, six women out of every ten were either mildly or moderately anaemic.

Rao (1988) found that the incidence of anaemia was highest among women and young children, varying between 60 to 70 per cent mainly due to low intake and/or poor absorption of dietary iron.

b. Correlation between iron intake and blood haemoglobin levels

Scatter diagram showing the correlation between iron intake and blood haemoglobin level of subsamples (N=60) of groups A, B and C is represented by Figure 11. Individual values of iron intake are appended (Appendix E).



SCATTER DIAGRAM OF CORRELATION BETWEEN
IRON INTAKE AND HAEMOGLOBIN LEVEL OF THE
WORKING WOMEN
FIGURE 11

A highly positive correlation ($r = 0.916$) was found to exist between the iron intake and haemoglobin level ($P < 0.01$). With an increase in iron intake, there was a subsequent increase in haemoglobin level (Fig. 13). This result suggests that iron supplements to diets of the three groups of women workers would result in positive inputs in their blood picture.

c. Blood cholesterol, sugar and protein levels and eosinophil count

A single blood sample was drawn to estimate the mean concentration of cholesterol, random blood sugar, total protein and eosinophil count (Table XXIII). The individual values are given in Appendix F.

TABLE XXIII
BIOCHEMICAL PICTURE OF WORKING WOMEN

S.No.	Biochemical Parameters	Mean levels			't' value		
		Group A	Group B	Group C	A vs B	A vs C	B vs C
1.	Serum Total Proteins (g/dl)	5.63 ± 0.45	6.54 ± 0.44	6.06 ± 0.33	6.47**	3.47**	3.87**
2.	Serum Cholesterol (mg/dl)	158.30 ± 20.79	202.90 ± 20.81	193.00 ± 34.90	6.78**	4.37**	0.54 NS
3.	Random Blood Sugar (g/dl)	101.05 ± 19.41	134.65 ± 27.09	112.85 ± 19.69	4.51**	1.91 NS	2.91**
4.	Eosinophil Count (%)	15.80 ± 3.60	17.93 ± 5.64	4.65 ± 1.77	1.42 NS	12.44**	10.05**

Key: ** - Significant at one per cent level
NS - Not significant

Group B consisting of textile workers had the highest values of serum total proteins, cholesterol level, random blood sugar level and eosinophil count. Elevated random blood sugar levels attributed to high fat, energy and sugar intake might be an early indicator of their susceptibility to diabetes mellitus, a stress-related disorder. Members in groups B and C had nearly 200 g/dl serum cholesterol level and reflected the higher fat and calorie intake.

Bush et al. (1988) reported that individuals belonging to high income group had significantly high serum cholesterol level (323.3 ± 22.6 mg/dl) while low income group individuals had cholesterol level (241.8 ± 12.3 mg/dl) nearer to the accepted normal values (150-250 mg/dl). The increased cholesterol levels may be due to several factors such as genetic determinants, alcohol consumption, low consumption of phytin phosphorous foods, high caloric intake, obesity, smoking, age, occupation and sex hormones

The protein level of the three groups were within normal levels. The eosinophil count of group C women was within the normal range (4.65 ± 1.77) but those of group B (17.93 ± 5.64) and group A (15.8 ± 3.6) were elevated, indicating the response of the body's immune system to different infections and diseases, especially respiratory diseases.

There were significant differences ($P < 0.01$) between the serum total protein levels of groups A, B and C; serum cholesterol level of group A versus B; and B versus C; random blood sugar level of group A versus B and A versus C; and eosinophil count of group A versus C and B versus C.

4. Food and nutrient intake of working women

a. Mean food intake

The food consumption pattern of the randomly selected subsample of 60 working women is presented in Table XXIV and Figure 12. The individual values are furnished in Appendix D.

TABLE XXIV
 MEAN FOOD INTAKE OF SELECTED WORKING WOMEN

Foods	RDA for heavy workers (group A)			RDA for moderate workers (group B)			RDA for sedentary workers (group C)			Per cent of RDA	Mean intake	Per cent of RDA
	RDA for heavy workers	Mean intake	Per cent of RDA	RDA for moderate workers	Mean intake	Per cent of RDA	RDA for sedentary workers	Mean intake	Per cent of RDA			
Cereals	575	518+23.85	90.1	440	422+16.76	95.9	410	390.35+14.78	95.2			
Pulses*	50	36.3+5.42	72.6	45	64.85+7.75	144.1	40	51.9+6.72	129.8			
Leafy vegetables	150	14.65+3.82	9.8	100	23.15+3.66	23.2	100	21.2+2.24	21.2			
Other vegetables	100	32.0+4.78	32.0	40	59.95+7.01	149.9	40	53.2+5.14	133.0			
Roots and tubers	60	52.05+6.51	86.8	50	70.45+6.73	140.9	50	54.35+5.55	108.7			
Fruits	30	14.55+5.46	48.5	30	31.65+8.07	105.5	30	25.3+5.68	84.3			
Milk and milk products	200	56.2+9.44	28.1	150	140.2+29.87	93.5	100	113.15+27.67	113.2			
Fats and oils	40	18.05+2.28	45.1	25	28.8+3.02	115.2	20	23.15+3.07	115.8			
Sugar and jaggery	40	39.30+5.16	98.3	20	31.5+4.35	157.5	20	30.05+3.97	150.3			

Note : *Pulses' includes pulses and fleshy foods

In general, the quantity of food consumed by group A women was low except for sugar, when compared to the ICMR suggested food allowances (1989). The intake of green leafy vegetables was grossly deficient (only 9.8 % of suggested allowances), followed by intake of milk (28.1 %), other vegetables (32 %), fats and oils (45.1 %), fruits (48.5 %) and pulses (72.6 %). The intake of cereals (518 ± 23.85 g), roots and tubers (52.5 ± 6.51 g) and sugar and jaggery (39.3 ± 5.16 g) was adequate.

Among the three groups, group B women had the highest food intake with adequate cereal, pulse, other vegetables, roots and tubers, fruits, milk, fats and oils and sugar intake in comparison with the suggested food allowances. There was an excess intake of sugar (57.5 %), other vegetables (49.9 %), pulses and non-vegetarian foods (44.1 %), roots and tubers (40.9 %) and fats and oils (15.2 %) over and above the suggested allowances. Less than one-fourth of the allowance for green leafy vegetables was consumed by the women.

Group C women consumed adequate amounts of cereals (95.21 %) and excess of pulses (29.75 %), other vegetables (33 %) and sugar (50.3 %) over and above the suggested allowances. Poor intake of green leafy vegetables (21.2 %) and moderate intake of fruits (84.3 %) were observed.

The results of a dietary study by Kaur and Sood (1988) of spinning mill workers showed that the consumption of cereals, green leafy vegetables, fruits, milk and milk products, sugar and jaggery, fats and oils, eggs and fleshy foods by them was inadequate when compared to recommended allowance of ICMR.

In summation, women of group A with low socio-economic background, who were either illiterate or semi-literate, had diets that were chiefly rice-based and poor in protective foods. As income and educational levels improved, variety and quantity of foods consumed increased as seen in groups B and C.

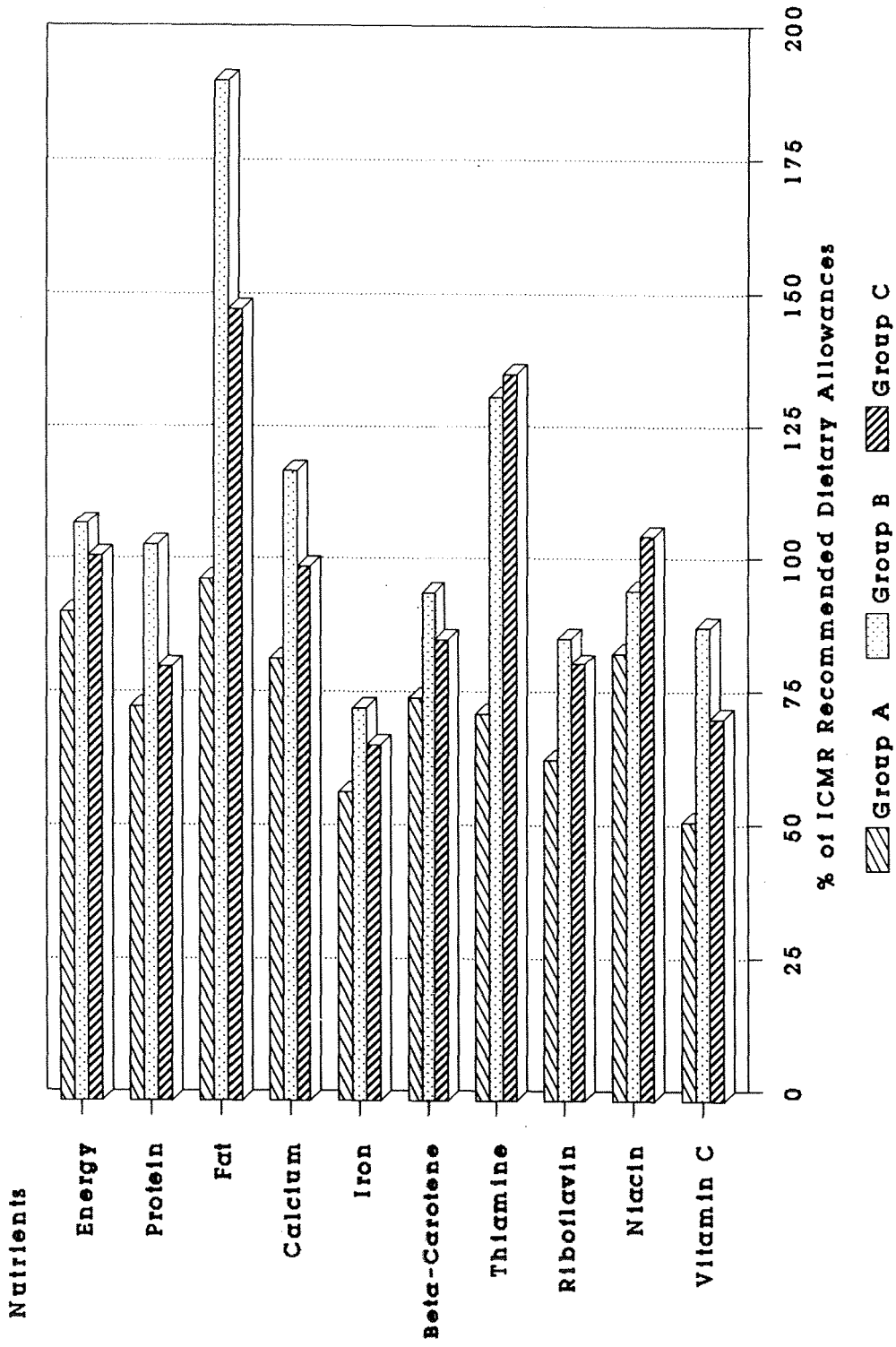
b. Mean nutrient intake

The mean nutrient intake of the 60 randomly selected working women is presented in Table XXV and Figure 13 with the individual values in Appendix E.

TABLE XXV

MEAN NUTRIENT INTAKE OF SELECTED WORKING WOMEN

Nutrient	RDA for heavy workers (group A)			RDA for moderate workers (group B)			RDA for sedentary workers (group C)			Per cent of RDA	Mean intake	Per cent of RDA
	n	Mean intake	Per cent of RDA	n	Mean intake	Per cent of RDA	n	Mean intake	Per cent of RDA			
Energy (Kcal)	2925	2682±296	91.7	2225	2411±283	108.4	1875	1918±123	102.3			
Protein (g)	50	37.0±4.7	73.9	50	52.2±4.0	104.4	50	40.7±2.6	81.5			
Fat (g)	20	19.6±2.2	97.9	20	38.3±2.8	191.6	20	29.8±3.3	148.19			
Calcium (mg)	400	331.6±36.8	82.9	400	473.0±43.2	118.3	400	401.1±47.2	100.3			
Iron (mg)	30	17.4±3.1	58.0	30	22.1±2.3	73.6	30	20.1±3.4	66.9			
Beta-carotene (mcg)	2400	1813±264	75.6	2400	2288±214	95.3	2400	2076±207	86.5			
Thiamine (mg)	1.2	0.90±0.2	72.7	1.1	1.50±0.3	132.3	0.9	1.20±0.1	136.7			
Riboflavin (mg)	1.5	1.00±0.3	64.1	1.3	1.10±0.2	86.7	1.1	0.90±0.2	82.0			
Niacin (mg)	16	13.4±1.3	84.0	14	13.4±1.7	95.8	12	12.7±1.7	106.0			
Vitamin C (mg)	40	21±5	52.5	40	36±7	90.0	40	29±4	72.5			



NUTRIENT INTAKE OF SELECTED WORKING WOMEN
FIGURE 13

The three day food weight survey indicated that the intake of protein (73.9 %), calcium (82.9 %), iron (58 %), beta-carotene (75.6 %), thiamine (72.7 %), riboflavin (64.1 %), niacin (84 %) and vitamin C (52.5 % of the RDA) were below the ICMR recommended allowances in group A. Adequate amounts of energy (91.7 %) and fat (97.9 %) were consumed by the subjects.

Women of group B consumed sufficient quantity of energy (108.4 %), protein (104.4 %), beta-carotene (95.3 %), B-complex vitamins (85 %) and vitamin C (88.8 %), nearly double the recommended allowance for fat (191.6 %) and less than three-fourths of the iron requirement. The nutrient intakes of this group were similar to those recorded by Guzman et al. (1988) among 393 textile mill workers.

Kaur and Sood (1988) reported that diets of the mill workers were deficient in energy, vitamin A, riboflavin, niacin and vitamin C, while the intake of protein, calcium, iron and thiamine were quite satisfactory.

The intake of group C women of energy (102.3 %), fat (148.1 %), calcium (100.3 %), thiamine (136.7 %) and niacin (106 %) met the RDA. Deficient intake of protein (81.5 %), iron (66.9 %), beta-carotene (86.5 %), riboflavin (82 %) and vitamin C (71.8 %) were observed.

The average national dietary energy intake is around 2,280 Kcal, which is close to the RDI. However the intake is as low as 1,871 Kcal/consumer/day in the state of Tamil Nadu. The mean national intake of protein is around 62g/cu/day a level close to the RDI of 60g. The intakes in Andhra Pradesh, Kerala, Tamil Nadu (45.6g/cu/day) and West Bengal are below the RDI. The country's overall and Tamil Nadu state mean intakes of vitamin A are 350 mg/cu and 240 mg/cu, both of which are much below the RDI of 600 mg (NNMB, 1990).

In brief, though the cereal consumption of the three groups were nearly the same, the energy needs of group A were not met. The nutrient deficiencies especially of group A reflected the food deficiencies. Women of group B were found to consume nearly double the requirement for fat which aided in performing strenuous and repetitive muscular work.

E. Reproductive Performance and Child Care Practices of Working Women

1. Reproductive performance of working women

Table XXVI provides details of the reproductive performance of the working women.

TABLE XXVI
REPRODUCTIVE PERFORMANCE OF THE WORKING WOMEN

(n=200/group)					
S. No.	Details	Group A %	Group B %	Group C %	Mean %
1. Age at menarche (yrs)					
	Upto 9	9.0	2.0	5.0	5.3
	10-12	26.5	51.5	43.0	40.3
	13 and above	64.5	46.5	52.0	54.4
	Mean age (yrs & mo.)	13.7 \pm 1.3	12.6 \pm 1.5	12.8 \pm 2.0	12.7 \pm 1.6
2. Marital status					
	Unmarried	0.5	4.5	39.5	14.83
	Married	99.5	95.5	60.5	85.17
3. Age at first pregnancy (yrs)					
	\leq 17	72.3 (136)	2.7 (5)	1.7 (2)	29.0 (143)
	18-23	21.8 (41)	64.2 (118)	22.3 (27)	37.7 (186)
	24-29	5.9 (11)	23.9 (44)	56.2 (68)	25.0 (123)
	\geq 30	-	9.2 (17)	19.8 (24)	8.3 (41)
	Total No. of women pregnant at least once	188	184	121	493
	Mean age at first pregnancy (yrs & mo.)	17.2 \pm 2.2	20.5 \pm 2.5	23.7 \pm 1.1	20.5 \pm 3.0
4. Infant mortality					
	No. of live births during last year	18	7	2	27
	No. of infant deaths	4	1	-	5
	IMR	222	143	-	185

Note: Values in parenthesis indicate number of subjects

In the present study, the mean ages at menarche of the working women were 13.7 ± 1.3 , 12.6 ± 1.5 and 12.8 ± 2 years and months among groups A, B and C respectively. Majority of the women in the groups A and B (> 85 %) were married and pregnant at least once (> 82 %). About 40 per cent of group C women were single. The mean age at first pregnancy for the entire group was 20.5 ± 3 years and months. It was noted that the maximum number of women in group C remained unmarried while only one among the 200 was unmarried in group A. With an increase in educational status, age of marriage was postponed.

Group A women were married and had experienced child birth even before 17 years (72.3 %). The number of live births and infant deaths (during the past years) among groups A, B and C were 18, 7 and 2; and 4, 1 and nil, respectively.

In a study by Bhawani and Sharada (1989) the age of menarche of girls from 30 selected families, varied from 10 to 15 years, and was influenced by food intake, income level, family size and other factors. In the present study, the mean age of menarche was the lowest in group B where the nutritional status was found to be slightly better when compared to the other two groups.

In prospective studies covering 49,302 rural and 35,841 urban households, the average age at puberty for urban girls (14.0 \pm 0.1 yrs. & mo.) was significantly lower than that of rural girls (14.3 yrs). The mean ages at marriage in rural and urban areas were 16.9 and 17 years respectively (Rao, 1988).

The IMR of the lowest socio-economic group A (222), was the highest as a result of early pregnancies, poor child spacing, poverty, malnutrition, hazardous work conditions and lack of health facilities. The IMR of group B women was higher than the national aggregate of 91 (Census of India, 1991) and it may be due to hazardous work conditions, anaemia and other factors. Group C women not only married later but also bore fewer children and no cases of infant mortality were observed during the past year.

In a study on 601 married workers, IMR was relatively high among off-spring of mothers aged 45 years and above, and low among mothers aged 25 to 34 years (Bennett, 1988). In the present investigation also IMR was found to be lower among mothers of 20 to 30 years age group.

2. Commonly occurring reproductive health problems

One of the objectives for studying the reproductive performance of working women was to analyse the incidence of complications before, during and after pregnancy and lactation. Table XXVII lists the common reproductive health problems faced by the women.

TABLE XXVII
 COMPLICATIONS BEFORE AND AFTER PREGNANCY AND LACTATION
 (n=200/group)

S.No.	Reproductive health problems	Group A (%)	Group B (%)	Group C (%)	Total (%)
1.	Nil	36.5	45.0	71.0	50.8
2.	Problems				
a.	Susceptibility to infection	26.0	21.5	8.0	18.5
b.	Menstrual problems	20.5	17.0	11.5	16.3
c.	Still birth/abortion/miscarriage	22.0	14.5	10.5	15.7
d.	Low birth weight of infant	28.0	14.5	10.5	15.7
e.	Excessive postpartum haemorrhage	15.5	19.0	5.0	13.2
f.	Premature birth of infant	12.5	6.5	2.5	7.2
g.	Oedema/hypertension/diabetes	9.5	7.0	4.0	6.8
h.	Menopausal problems	5.5	3.0	1.5	3.3
i.	Malformed/handicapped infant	5.0	2.5	1.0	2.8
j.	Infertility	0.5	2.0	1.0	1.2
k.	Others	29.0	36.5	14.5	26.7

Maximum number of women in group C were not affected by reproductive health problems (71 %), in contrast to women of group B (45 %) and group C (36.5 %). Increased susceptibility to infections due to anaemia and other nutritional deficiencies (26 % in group A and 21.5 % in group B), menstrual problems including heavy and painful menstruation, 'spotting' or white discharge (20.5 % in group A and 17 % in group B), spontaneous abortions (22 % in group A and 14.5 % in group B and 10.5 % group C), low birth weight of infants (28 % in group A and 14.5 % in group B), and excessive postpartum haemorrhage, mainly due to anaemia (15.5 % in group A and 19 % in group B) were the common reproductive complications faced. National surveys by the NIN (1993) among the pregnant women revealed that as many as 87.5 per cent of pregnant Indian women were anaemic (Hb < 11 g %), with 13 per cent being severely anaemic (Hb < 7 g %) and 33.6 per cent being moderately anaemic (Hb 7 g to 9 g %).

Studies conducted in different parts of India on different population groups have revealed that the incidence of low birth weight babies was highest (5.3%) in women with grade III Chronic Energy Deficiency and gradually declined as the BMI status of mothers improved (NIN, 1993). In the present investigation, low birth weight of infants was

observed among 28, 4.5 and 4.5 per cent of the deliveries in groups A, B and C respectively. The highest instances of low birth weight had been in group A where mothers were more malnourished.

Sudhir (1992) stated that some of the common reproductive hazards that agricultural women labourers face from exposure to herbicides and pesticides are anaemia, menstrual dysfunction, birth defects and still births. Carrying heavy loads and going up ladders caused spontaneous miscarriages among pregnant construction women (Health Information of India, 1990). In the present investigation also construction workers experienced more miscarriages (22 %) while group C workers had the least (10.5 %). Also women have greater susceptibility to the effects of exposure to toxic substances in the work place (Messite and Bond, 1980 and Axelsson, 1984).

3. Maternal morbidity pattern of working women

Association between maternal morbidity, in terms of incidence of occupational and nutritional disorders and incidence of reproductive health complaints is given in Table XXVIII.

TABLE XXVIII

**ASSOCIATION BETWEEN MATERNAL MORBIDITY AND REPRODUCTIVE
HEALTH COMPLAINTS**

(N=600)

S. No.	Reproductive health complaints	Incidence of occupational diseases				Total	x ² value
		Nil	1-3	4-6	≥ 7		
1.	Nil	97	80	121	7	305	
2.	1-2	27	38	42	60	167	
3.	≥ 3	4	11	87	26	128	
	Total	128	129	250	93	600	164.53**

S. No.	Reproductive health complaints	Incidence of nutritional disorders			Total	x ² value
		Nil	1-3	≥ 4		
1.	Nil	172	98	35	305	
2.	1-2	26	52	89	167	
3.	≥ 3	6	57	65	128	
	Total	204	207	189	600	177.91**

Key : ** - Significant at one per cent level

During periods of physiological stress like pregnancy and lactation, the working mother is more susceptible to infections and nutritional deficiencies, due to the increased requirements for food and nutrients. Table XXVIII reveals a highly significant association ($P < 0.01$) between the incidence of reproductive health complaints and occupational diseases. Half of the women ($n=305$) did not have any reproductive complaints, 167 and 128 women complained of one to two and three or more reproductive

health complaints respectively. Ninety seven, of the women were free of reproductive and occupational disorders. In contrast, 87, 60 and 26 women who had more than one reproductive complaint, were affected by four to six and more than six occupational disorders, respectively.

A similar pattern in the incidence of nutritional disorders in association with reproductive health complaints was observed which was found to be significant ($P < 0.01$). The number of women free from nutritional and reproductive disorders was 172. Women with one to two and three or more reproductive complaints, exhibited four or more nutritional deficiencies, during pregnancy and lactation (89 and 65 women respectively). It may be concluded that in accordance with other studies (NIOSH, 1991 and Sudhir, 1992) working women especially pregnant and lactating mothers are more likely to be affected by poor and hazardous work conditions. This ultimately affects their health and work performance and also that of their children.

4. Association between BMI and number of reproductive health complaints

The association between BMI and number of reproductive health complaints is presented in Table XXIX.

TABLE XXIX
 ASSOCIATION BETWEEN BODY MASS INDEX AND NUMBER OF REPRODUCTIVE COMPLAINTS

Group	Number of reproductive complaints		't' values			
	1-2 (2)	> 3 (3)	1 vs 2	2 vs 3	1 vs 3	
A	22.68+2.19 ⁺ (77)++	20.86+2.34 (59)	20.34+2.28 (64)	4.648**	1.247 NS	6.176**
B	24.60+2.43 (92)	23.79+3.28 (62)	22.12+2.27 (46)	1.755 NS	2.966**	5.781**
C	22.12+3.37 (121)	21.66+3.55 (67)	18.38+4.69 (12)	0.879 NS	2.798**	3.527**

Key : NS - Not significant

** - Significant at one per cent level

+ - Mean BMI values

++ - No. of women with reproductive complaints.

Numerous studies have pointed out the relationship between weight gain before and during gestation and the occurrence of obstetric complications before and after child birth. In the present study, women of all the three groups, without any reproductive health complaints, be it minor or major had BMI that were comparable to the normal standards of 18 to 25. When the groups were studied independently, statistically significant associations were observed between the mean BMI values of women affected by different extent of obstetric complications. For example in group A, application of student's 't'-test revealed that there was a significant difference ($P < 0.01$) between BMI of women with no complications ($BMI = 22.68 \pm 2.19$) and those with one to two complications ($BMI = 20.86 \pm 2.34$) and three or more complications ($BMI = 20.34 \pm 2.28$). Among group B workers there was a slight but no statistically significant difference in BMI values of women without complications and with one to two complications. But there existed a significant difference between BMI values of women with one to two complications and three or more complications in groups B and C ($P < 0.01$).

5. Family planning practices

The family planning measures adopted by women of group A were intra-uterine devices like loop and copper-T (14.5 %) and female sterilization (8.5 %). Women of groups B

and C used hormone pills (21.5 and 27.5 %) and intra-uterine devices (6.5 and 11 %). Only 11.5 per cent of the husbands' of the women of groups B and C used condoms. It is being recognised that empowering women to control their fertility, family size and spacing is a stimulus to social and economic change.

6. Infant feeding and weaning practices of the working women

Literature has not provided clear evidence that the children of working mothers have a lower nutritional state than those of mothers who do not work outside the home (Bennet, 1988). However there has been a gradual change in infant feeding practices of working mothers, depending on the nature of job, provision of creche, distance from home and other factors. Table XXX depicts the weaning practices of the selected working women.

TABLE XXX
FEEDING AND WEANING PRACTICES OF WORKING WOMEN

(n=200/group)

S.No.	Feeding/weaning practices	Group A	Group B	Group C
1.	Mothers carrying child to work place (%)	68.0	11.0	2.0
2.	Mean age at introduction of supplementary milk (months)	3.11 ± 1.32	2.13 ± 1.51	2.44 ± 1.36
3.	Mean age at introduction of semi-solid/solid foods (months)	4.53 ± 2.83	3.41 ± 2.23	3.64 ± 2.45
4.	Distribution of children by age at weaning in months (%)			
	1-3	32.0	41.0	37.5
	4-6	38.5	40.5	43.0
	7-12	19.5	16.0	16.5
	13-24	10.0	2.0	3.0

Due to the migratory nature of construction work, 68 per cent of group A mothers took their infants and pre-schoolers to their work place. Only a small percentage (11 and 2) of working mothers in groups B and C took their infants to their work place as they were discouraged by their managements from feeding and taking care of the infants at the work site.

All the infants were breast fed and supplementary milk was introduced at the mean ages of 2.13 (group B), 2.44 (group C) and 3.11 months (group A). By the age of three to four months almost all infants received semi-solid or solid

supplements in addition to breast milk. Women working in textiles mills breast fed and weaned their children much earlier (3.41 mo.) than women in group A.

The frequency distribution of children by age at weaning showed that by the age of three months more than one-third of the children were completely weaned. The main reason for weaning were work conditions (41.2 %), lack of breast milk (37.8 %) and other reasons like mothers ill health (17.3 %), or feeling that the child had grown up (3.7 %). Similar results were reported by Thimmayamma et al. (1980) and Chatterjee (1993).

Phyllis (1991) in a study on 100 salt-pan women labourers, reported that due to lack of proper care and attention, infant morbidity and mortality were high. In a study among 750 working mothers, Aggarwal (1986) reported that infections among children remained high where mothers worked outside the home, environmental sanitation and personal hygiene were poor; children were closely spaced; income standards were low and weaning periods started late.

F. Morbidity Among Working Women and the Effect of Various Influencing Factors

The morbidity pattern of the 600 working women in terms of incidence of occupational diseases and accidents, non-occupational and reproductive health complaints and nutritional deficiencies or excess, was observed by clinical

examination and by collection of secondary data from ESI hospitals.

1. Trend in the prevalence of occupational diseases

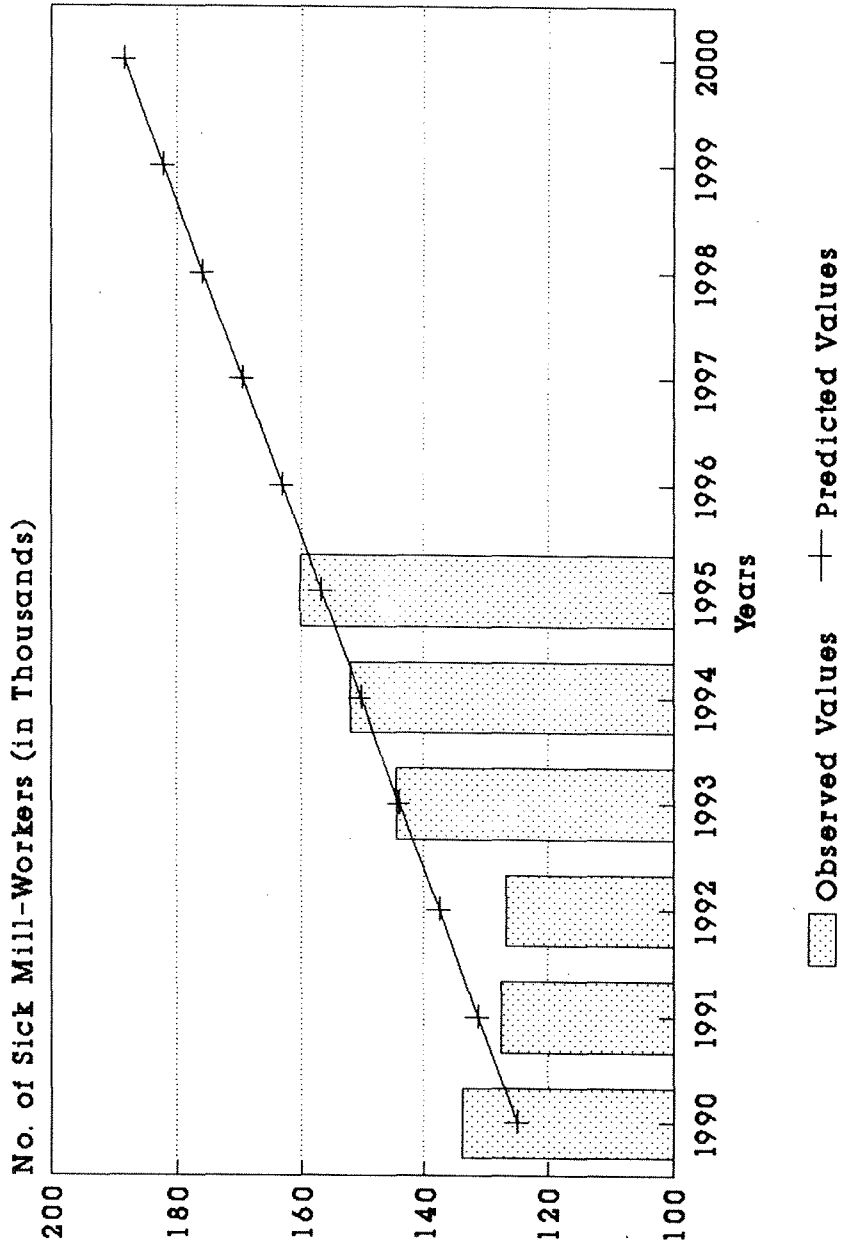
From the medical records of the Regional Administrative Medical Office of the ESI and Government Statistical Institute, the prevalence data on the trends of occupational diseases in Coimbatore district, was collected over the past six years and is presented in Table XXXI. A trend curve of the occupational disease incidence in Coimbatore district drawn as suggested by Gupta (1991) is presented in Figure 14.

TABLE XXXI
TREND IN THE PREVALENCE OF OCCUPATIONAL DISEASES AMONG MILL WORKERS IN COIMBATORE DISTRICT

Year	Number of workers falling sick/year	Predicted trend of number of sick workers/year
1990	1,33,852	1,24,960
1991	1,27,651	1,31,309
1992	1,26,837	1,37,659
1993	1,44,371	144,008
1994	1,52,278	1,57,357
1995	1,60,014	1,56,707
1996	-	1,63,056
1997	-	1,69,405
1998	-	1,75,754
1999	-	1,82,104
2000	-	1,88,453

$r = + 0.871$ **

Key : r = Karl Pearson's co-efficient of correlation
** - Significant at one per cent level.



TREND LINE OF THE PREVALENCE OF
OCCUPATIONAL DISEASES AMONG MILL-WORKERS
IN COIMBATORE DISTRICT

FIGURE 14

In the year 1990, 1,33,852 number of ESI insured workers were diagnosed to having occupation - related health disorders and were treated at any one of the 35 ESI dispensaries and hospitals. It was alarming to note that this number had increased significantly ($P < 0.01$) to 1,60,014 sick workers in 1995 ($r=0.871$). Using the trend curve, it was predicted that the number of patients to be admitted in hospitals in Coimbatore district, by the year 2000 will be approximately 1,88,453, indicating a definite rise in the incidence of occupational health problems. In absolute number, it may even be more due to changing work profile and life style, as women enter new areas of work and population growth.

2. Incidence of diseases

The incidence of occupational and non-occupational diseases among the working women is given in Table XXXII.

TABLE XXXII
INCIDENCE OF DISEASES AMONG WORKING WOMEN

(n=200/group)

S.No.	Diseases/ disorders	Percentage incidence			Mean
		Group A	Group B	Group C	
I. Occupational diseases/disorders					
1.	Musculo-skeletal disorders	73.5	57.0	53.5	61.3
2.	Accidents	52.0	32.0	8.0	30.7
3.	Skin disorders	45.0	24.5	9.5	26.3
4.	Eye disorders	33.5	19.5	20.5	24.5
5.	Respiratory disorders	17.0	43.5	6.0	22.2
6.	Neurological disorders	17.5	14.0	19.0	16.8
7.	Ear/hearing disorders	19.0	22.5	4.0	15.2
8.	Others	12.5	13.0	5.0	10.2
II. Non-occupational health complaints					
1.	Common health complaints	64.0	51.0	43.0	52.7
2.	Reproductory problems	63.5	55.0	33.0	50.5
3.	Cardiovascular disorders	6.5	11.0	6.0	7.8
4.	Others	53.5	44.5	66.5	54.8

Musculo-skeletal disorders, especially pain, sprain, disfigurement of the lower back, wrist, joints of fingers and soles of feet, affected more than 60 per cent of the entire population. Accidents like lacerations, bruises, bone fractures and dislocations, affected half of group A women and 32 per cent of group B women due to the hazardous nature of their work in comparison with clerical work. Skin

complaints like fungal infections, ulcerations, rashes, dry, flaky and pigmented skin, callouses and sun-burn affected 45 per cent of group A women. Dermatitis, due to exposure to dyes, acids and bleaches, was characteristic of textile workers (24.5 %). One-fourth of the entire sample of women were affected by problems of poor vision, poor lacrimation, irritation and infection, as a result of concentrating on their jobs in poor work environments. Flying splinters of rocks, sand or grit lodging in the eye was a frequent complaint of group A workers. Respiratory disorders like allergies to dust and cotton fibre, asthma, lung congestion, byssinosis etc., affected group B workers, due to cotton dust pollution. Neurological disorders like paraesthesia, tremors of arms and fingers, pain, inability to grasp objects (Carpal Tunnel syndrome) and tenosynovitis affected 16.8 per cent of the entire population, almost equally. Hearing disorders, excessive wax formation and partial hearing loss were reported by one-fifth of groups A and B. Other disorders such as peptic ulcer, diabetes mellitus, tumours, liver and kidney disorders, etc., contributed to 10.2 per cent of occupational diseases.

Half of the entire population was prone to common health complaints like viral fever/infections, gastrointestinal disorders like dysentery, constipation, piles,

flatulence, etc. Reproductive disorders were reported by 63.5, 55 and 33 per cent of groups A, B and C respectively.

Textile workers of Ahmedabad working in 40 mills, numbering 50,000 workers, suffer from byssinosis with symptoms of lung congestion and respiratory irritation. According to the National Institute of Occupational Health (NIOH) Ahmedabad, it occurs due to continued exposure to cotton puff called 'bract' found in the leafy portion of the plant collected from fields. A common problem is the inability of local physicians to diagnose the element as neither chest X-rays nor pathological tests give any indication of byssinosis (NIOH, 1994).

In a study of textile workers, the occurrence of respiratory diseases (65.9 %) was found to be maximum in carding and spinning sections, followed by ear, nose and throat (ENT) complaints (21.2 %), chronic diseases (14.9 %) and other minor illness (13.5 %). They were attributed to high cotton dust level (352.24 mts/sq.m/week), continuous noise produced by looms and stress at work. The type of fuel used-coal, had an effect on the incidence of respiratory diseases (62.5 %), in addition to pollutants from job environment (Selvarani, 1989).

3. Correlation between eosinophil count and incidence of respiratory disorders

Table XXXIII and Figure 15 presents the correlation between eosinophil count and the incidence of respiratory disorders among the subsample of 60 women.

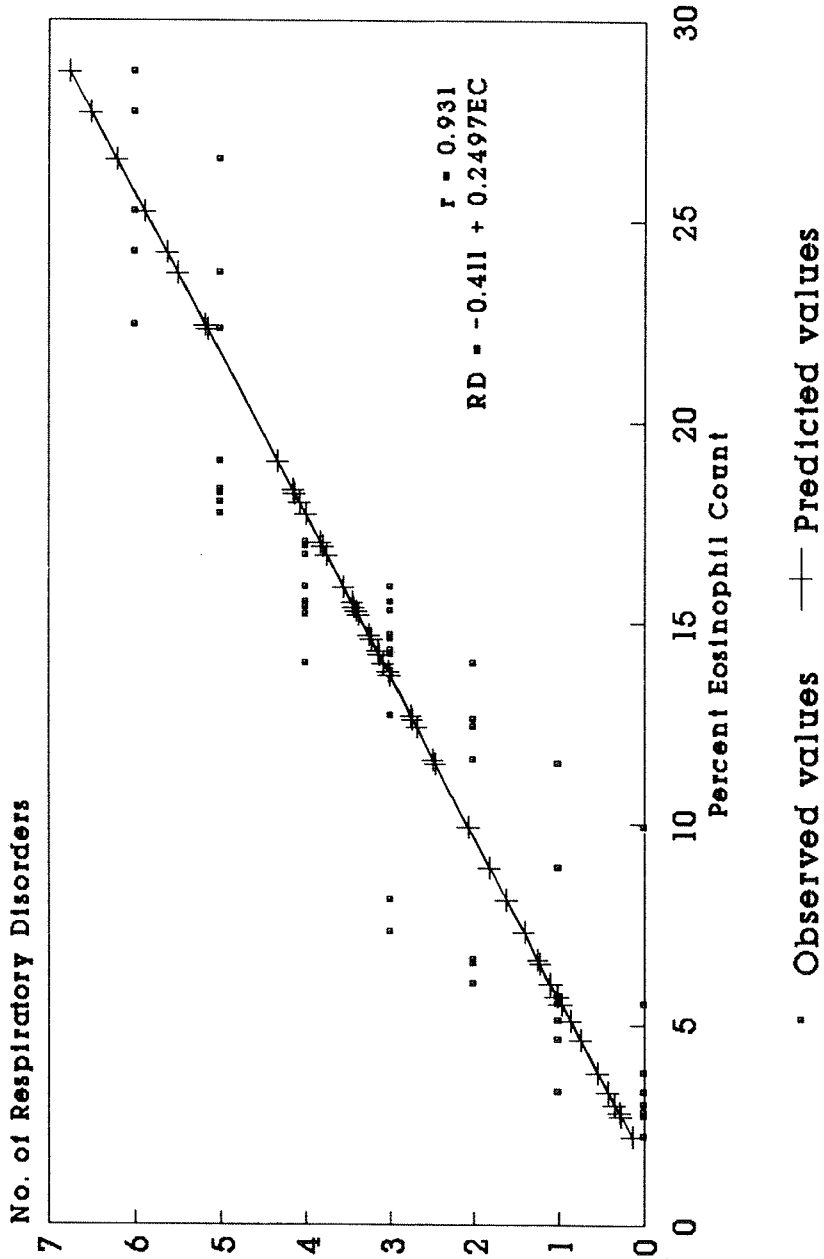
TABLE XXXIII
CORRELATION BETWEEN EOSINOPHIL COUNT AND INCIDENCE OF RESPIRATORY DISORDERS

Group	Mean eosinophil count (%)	Mean number of respiratory disorders
A	15.80	3.45
B	17.93	4.00
C	4.65	0.90
Total	12.79	2.78

$r = 0.931$; Significant at one per cent level.

Note: r = Karl Pearson's co-efficient of correlation

Highly significant correlations were found between the eosinophil counts and incidence of respiratory disorders among the working women ($r = 0.931$). It was also observed that 70.5, 58 and 42.5 per cent of women in groups A, B and C had blood haemoglobin levels lower than 12 g/dl. Differential count indicated that 100, 100 and 20 per cent of the subjects in groups A, B and C respectively exceeded the standard eosinophil count for industrial workers (1-6 %).



SCATTER DIAGRAM OF CORRELATION BETWEEN
EOSINOPHIL COUNT AND RESPIRATORY
DISORDERS OF WORKING WOMEN
FIGURE 15

In a study of 230 industrial workers, 35 and 77 per cent of regular and contract workers had abnormal levels of eosinophil count with mean values of 15.9 and 7.3 per cent respectively (Kannan and Lalitha, 1994). On the other hand, in a comparative study of 100 male and 100 female workers in three spinning mills, the eosinophil count was within the normal limits, indicating a clean work environment (Saraswathi and Maheswari, 1994).

4. Prevalence of hypertension among the working women

The prevalence of hypertension among the working women is presented in Table XXXIV.

TABLE XXXIV

PREVALENCE OF HYPERTENSION AMONG THE SELECTED WORKING WOMEN

(n=200/group)

S.No.	Hypertension classification	No. of women			Total
		Group A	Group B	Group C	
1. Systolic pressure					
a.	Normal range (120-139)	192	187	196	575
b.	Mild Hypertension (140-159)	8	8	2	18
c.	Moderate hypertension-I (160-179)	-	2	-	2
d.	Moderate hypertension-II (180-199)	-	3	-	3
e.	Severe hypertension (> 200)	-	-	2	2
Mean systolic pressure 123.85 ± 7.20 123.52 ± 10.73 122.88 ± 11.15 123.41 ± 9.85 (mm Hg)					
2. Diastolic Pressure					
a.	Normal range (70 - 89)	198	194	196	588
b.	Hypertension (> 90)	2	6	4	12
Mean diastolic pressure 80.15 ± 1.82 80.43 ± 0.77 79.80 ± 2.24 80.13 ± 2.38 (mm Hg)					

Nearly 96 per cent of the selected population were normal with systolic and diastolic pressures within the normal ranges. Only three per cent of the women were mildly hypertensive with systolic blood pressure values of 140-159 mm of Hg. Two per cent of the women were hypertensive, with diastolic blood pressure values greater than 90 mm of Hg. The negligible incidence of cardiovascular diseases especially hypertension, inspite of the frequently voiced complaint of "stress", may be attributed to the fact that women studied were younger in the present investigation. Among the three groups studied more cases of hypertension were recorded in group B.

5. Association between provision of work facilities and the incidence of occupational diseases

Table XXXV describes the association between provision of work facilities as discussed in Table XI and the incidence of occupational diseases as listed in Table XXXII.

TABLE XXXV
ASSOCIATION BETWEEN PROVISION OF WORK FACILITIES AND THE
INCIDENCE OF OCCUPATIONAL DISEASES
(N=600)

S.No.	No. of work facilities present	No. of occupational diseases				Total
		Nil	1-3	4-6	≥ 7	
1.	Nil	2	7	96	63	168
2.	1 - 5	30	43	136	16	225
3.	6 - 10	45	65	12	11	133
4.	≥ 11	51	14	6	3	74
Total		128	129	250	93	600

χ^2 value = 353.77; Significant at one per cent level

A highly significant association at one per cent level was found between the number of work facilities present as per OHS legislation and the incidence of occupational diseases among the entire sample of 600 working women. As the existence of protective work conditions increased, the morbidity rate declined. For instance, when one to five facilities were provided, 30 women were found to be free of occupational diseases. When the work facilities increased to more than 11, the number of normal women also increased to 51, concurrently. Other studies by Newman and Beehr (1979) have established the fact that with better and healthier work environments, the exposure to occupational hazards is less, resulting in higher worker morale, work efficiency and better health status. The toxic effects of hazardous work

conditions may be additive, multiplicative (ie., one chemical agent potentiates the effect of another), synergistic or antagonistic.

6. Factors affecting the incidence of diseases and nutritional disorders

The effect of three significant factors-age, education and family income, influencing the incidence of the three different classes of diseases - occupational, non-occupational and nutritional, is discussed below:

a. Association between age profile and incidence of diseases

The age profile of the working women in association with incidence of diseases is provided in Table XXXVI.

TABLE XXXVI

ASSOCIATION BETWEEN AGE OF WORKING WOMEN AND THE INCIDENCE OF DISEASES

(N=600)

S.No.	Incidence of diseases	No. of women in the age groups of			Total	x ² value
		< 25 yrs	26-50 yrs	> 50 yrs		
1. Occupational diseases						
Nil		44	82	2	128	
1-3		57	69	3	129	22.55**
4-6		57	181	12	250	
≥ 7		25	66	2	93	
2. Non-occupational diseases						
Nil		30	70	0	100	
1-2		123	226	13	362	11.13*
≥ 3		30	102	6	138	
3. Nutritional disorders						
Nil		61	142	1	204	
1-3		70	131	6	207	12.65**
≥ 4		52	125	12	189	

Note : * - Significant at five per cent level
 ** - Significant at one per cent level.

Significant associations between the different age groups and incidence of occupational diseases and nutritional disorders ($P < 0.01$) and non-occupational diseases ($P < 0.05$) were revealed by Chi-square test. Of the entire sample, 30.2 per cent ($n=181$) of the women aged 26-50 years, suffered from four to six occupational diseases. Similar results were reported by Bihari et al. (1992), who stated that increase in age and years of job experience, had significant susceptibility to occupational diseases. Irrespective of age, 41.7 per cent of the working women were affected by four to six occupational complaints, especially those of musculo-skeletal, respiratory, neurological and ENT. With more years of exposure to stressful work environments, their level of morbidity also increased.

Middle aged women (26-50 years) followed by younger women (< 25 years) suffered from one to two non-occupational health complaints such as cold, fever, etc.

Of the entire sample ($n = 600$), 21.3, 16.7 and 34 per cent of the women were free from occupational, non-occupational and nutritional disorders respectively. That is one-third of the entire population was free from malnutrition.

With respect to age, 23.7 per cent ($n=142$) of middle aged women, (25-50 years) did not exhibit any signs of

nutritional disorders. More than one-fifth of the same age group exhibited one to more than four symptoms.

b. Association between literacy status and incidence of diseases

It has been hypothesized that the incidence of diseases is associated with literacy status of people, especially women. The association between literacy status and incidence of diseases is presented in Table XXXVII.

TABLE XXXVII

ASSOCIATION BETWEEN LITERACY STATUS OF WORKING WOMEN AND THE INCIDENCE OF DISEASES

S.No.	Incidence of diseases	No. of women with literacy levels			Total	χ^2 value
		Illiterate	Middle school	High school		
1. Occupational diseases						
Nil		22	27	19	60	128
1-3		23	32	14	60	129
4-6		83	85	40	42	250
≥ 7		37	24	12	20	93
2. Non-occupational diseases						
Nil		20	33	18	29	100
1-2		89	101	48	124	362
≥ 3		56	34	19	29	138
3. Nutritional disorders						
Nil		32	57	39	76	204
1-3		55	52	25	75	207
≥ 4		78	59	21	31	189

(N=600)

65.32**

20.31**

47.86**

Note : ** - Significant at one per cent level.

Significant association between literacy status and incidence of diseases were found at one per cent level. Women who were illiterate (13.8 %) and who had studied upto middle school (14.2 %), were suffering from four to six occupational diseases. Contrarily those with college education (10 %) were either free from occupational diseases, or exhibited one to three symptoms. Of the 165 illiterates (mainly group A and to a lesser extent group B), 22.4 per cent were affected by more than six symptoms of occupational diseases.

This may be indicative of the fact that with better education, working women are more aware of the need for occupational health services and are able to communicate their needs to their management and use the equipment provided in a better manner. In other words they are better suited to learning and implementing new job skills, safety measures and health care programmes, if they have a basic high school education.

A significant association also existed between educational status and incidence of non-occupational diseases. Illiterates (9.3 %) exhibited three or more non-occupational disorders like occasional fever, cold, ulcer and diabetes. Women who had studied upto middle school were slightly better than their counterparts with no education.

As women's education improved, the incidence of malnutrition was found to decrease significantly ($P < 0.01$). Thirteen per cent of the entire population were illiterate and suffered from four or more nutritional disorders chiefly iron deficiency anaemia, B-complex deficiency, vitamin C deficiency, vitamin A deficiency and to a lesser extent CED, iodine deficiency (goitre) and bone deformities (which may be attributed to calcium inadequacy). More than 12 per cent of graduate women did not have any nutritional disorders and another 12 per cent had one to three nutritional problems.

c. Association between family income and incidence of diseases

Table XXXVIII provides the association between family income and incidence of diseases.

TABLE XXXVIII

ASSOCIATION BETWEEN FAMILY INCOME OF WORKING WOMEN AND THE INCIDENCE OF DISEASES

S. No.	Incidence of diseases	No. of women belonging to income group			Total	X ² value
		Low income	Lower middle income	Upper middle income		
1. Occupational diseases						
	Nil	39	68	21	128	
	1-3	50	70	9	129	
	4-6	93	120	37	250	8.41 NS
	≥ 7	37	46	10	93	
2. Non-occupational diseases						
	Nil	29	61	10	100	
	1-2	131	177	54	362	8.68*
	≥ 3	59	66	13	138	
3. Nutritional disorders						
	Nil	52	117	35	204	
	1-3	78	101	28	207	22.98**
	≥ 4	89	86	14	189	

Note : NS - Not significant

* - Significant at five per cent level

** - Significant at one per cent level.

The level of family income seemed to have a significant effect on the incidence of nutritional disorders ($P < 0.01$) and non-occupational diseases ($P < 0.05$) but not on occupational diseases. This may be because nutritional deficiencies arise as a result of poor food and nutrient intake, which are partly attributed to low income. Whereas occupational diseases were dependant chiefly on the individual susceptibility of certain women and the years of exposure to occupational hazards. Women belonging to low and lower middle income groups had higher incidence of diseases. Education has a far more important role in helping workers to implement accident preventive and health protective programmes and help to reduce the chances of exposure to occupational hazards and ultimately the susceptibility to occupational diseases.

Nearly 30 per cent of lower middle income workers suffered from one to two non-occupational disorders, closely followed by low income group (21.8 %). The association between income and non-occupational diseases was significant at five per cent level.

A strong association ($P < 0.01$) was found between family income and incidence of nutritional disorders. More than 14 per cent of low and lower middle income groups exhibited four or more nutritional disorders.

d. Relationship between category of occupation and incidence of nutritional disorders

The mean number of nutritional problems in groups A, B and C were computed for the normal, mildly anaemic and moderately anaemic subjects in each group (Table XXXIX). While computing the incidence of nutritional deficiencies/excess, problems like B-complex deficiency, vitamin A and C deficiencies, CED, over weight and obesity were taken into account. Two-way interactions between the occupational and haemoglobin groups were studied.

TABLE XXXIX
RELATIONSHIP BETWEEN THE DEGREE OF ANAEMIA AND INCIDENCE OF
NUTRITIONAL PROBLEMS AMONG THE THREE OCCUPATIONAL GROUPS

Degree of anaemia	Mean number of nutritional disorders (n=200/group)			
	Group A	Group B	Group C	Mean (n=600)
1. Moderate	4.23 (71)	3.78 (18)	2.98 (44)	3.80 (133)
2. Mild	2.54 (70)	2.37 (98)	1.71 (41)	2.30 (209)
3. Normal	0.68 (59)	0.37 (84)	0.45 (115)	0.48 (258)
Mean	2.63	1.66	1.26	1.85

ANOVA Table

Source of variation	Sum of squares	Degrees of freedom	Mean square	F value
Between groups A, B and C	44.308	(3-1) = 2	22.154	13.481**
Between three anaemic groups	884.448	(3-1) = 2	442.224	269.104**
2 way interaction between occupation and Hb - groups	27.377	4	6.844	4.165**

Note : ** - Significant at one per cent level.
No. in parenthesis indicate the number of subjects

Table XXXIX clearly indicates that there was a significant association between the incidence of nutritional disorders and the three occupational groups. Group A workers exhibited twice the number of problems (2.63) than the group C workers (1.26).

When the entire population of 600 women was divided into three groups - normal (n=258), mildly anaemic (n=209) and moderately anaemic (n=133) it was found that there was a significant difference (at one % level) between the three groups with regard to the presence of nutritional deficiencies. That is, normal women (n=258) with haemoglobin values greater than the standard value of 12 g/dl, exhibited only negligible number (0.48) of nutritional deficiencies and that too, mainly of B complex and vitamin C

deficiencies. As the intensity of anaemia grew, the mean number of nutritional deficiencies/excess also increased significantly.

From the ANOVA table it was observed that the interaction between occupational groups (A, B and C) and anaemic groups (normal, mildly and moderately anaemic) was statistically significant at one per cent level. In other words, as the job became more stressful and hazardous, as in the case of construction work, women with lower haemoglobin levels were more susceptible to a higher number of nutritional disorders (4.23). In contrast, group C workers with better work facilities and less physically and mentally stressful jobs, were less anaemic and suffered from minimum number of nutritional disorders (0.45).

G. Work Performance and Influencing Factors

1. Effect of degree of anaemia on work output

Studies have proved that the degree of anaemia has a definite impact on work efficiency. Table XL presents the effect of anaemia on the work output of the three groups.

TABLE XL
EFFECT OF DEGREE OF ANAEMIA ON WORK OUTPUT
(N=600)

S. No.	Occupational Group	Degree of Anaemia (Haemoglobin values)			Critical difference			F value	
		Normal (1)	Mild Anaemia (2)	Moderate Anaemia (3)	Mean	1 vs 2	2 vs 3		1 vs 3
1.	Group A	59 163.51 +48.08	70 143.03 +45.79	71 123.61 +44.03	200 142.18 +48.38	*	*	*	12.21**
2.	Group B	84 41.44 +5.50	98 34.12 +5.79	18 29.11 +6.44	200 36.75 +7.11	*	*	*	54.38**
3.	Group C	115 89.37 +6.85	41 77.17 +8.18	44 64.16 +10.50	200 81.32 +13.05	*	*	*	162.93**

Key : * - Significant at five per cent level; ** - Significant at one per cent level; No. - Number of subjects
Work output of - Group A is number of bricks carried per day
Group B is number of spools of cotton yarn produced per day
Group C is percentage of typing efficiency (including speed and accuracy)

In all the three groups, the work output dropped dramatically, in response to declining haemoglobin levels ($P < 0.01$). For instance, group A women with more than 12 g/dl haemoglobin, carried an average of 164 bricks per day, but mildly anaemic and moderately anaemic women were able to carry only 143 and 124 bricks respectively (F value = 12.21). Similarly normal women of group B produced 41 spools of cotton yarn in contrast to moderately anaemic women who produced only 29 spools (F value = 54.38). Moderately anaemic women in group C typed not only slowly but also committed more number of errors, thereby having a lower typing efficiency score of 64 per cent in contrast to normal women who scored 89 per cent (F value = 162.93).

2. Relationship between work output and various influencing factors

Various factors such as age, reproductive performance (in terms of number of pregnancies), nutritional status (in terms of BMI, haemoglobin level and presence of nutritional disorders) and morbidity pattern (incidence of occupational and non-occupational disorders and hypertension), affect the work performance, wage earning capacity and ultimately the socio-economic status of workers. Hence the relationship between work output and various influencing factors among groups A, B and C were studied and are presented in Tables XLI to XLIII and Figure 16. Analysis of variance

(ANOVA) test was used to examine whether there was an overall significant relationship between each and every factor and the degree of work output (ie., classified as low, medium and high) using the formula $\bar{X} \pm 1 \text{ SD}$ (ie., mean ± the standard deviation).

TABLE XLII

RELATIONSHIP BETWEEN WORK OUTPUT OF CONSTRUCTION WORKERS AND VARIOUS INFLUENCING FACTORS
(n=200)

Factors	Work output (mean values)				Critical Difference			F value
	Low (n=32)	Medium (n=133)	High (n=35)	Total (n=200)	Low vs Medium	Medium vs High	Low vs High	
1. Age (yrs)	35.25 +10.36	35.57 +10.42	31.17 +7.53	34.75 +10.06	NS	*	NS	2.77 NS
2. Number of pregnancies	2.78 +1.70	2.41 +1.42	2.26 +1.63	2.45 +1.51	NS	NS	NS	1.10 NS
3. BMI	21.59 +1.95	21.27 +2.25	21.11 +2.49	21.29 +2.24	NS	NS	NS	0.41 NS
4. Haemoglobin (g/dl)	10.07 +1.39	10.70 +1.40	11.60 +1.33	10.76 +1.45	*	*	*	10.54**
5. Occupational diseases (No.)	3.31 +1.64	2.62 +1.62	2.03 +1.86	2.63 +1.70	*	NS	*	4.97**
6. Non-occupational diseases (No.)	2.03 +0.97	1.90 +1.07	1.54 +1.17	1.86 +1.08	NS	NS	NS	2.03 NS
7. Nutritional disorders (No.)	3.06 +1.79	2.81 +2.05	1.54 +1.95	2.63 +2.05	NS	*	*	6.48**
8. Blood Pressure-systolic (mm of Hg)	123.72 +6.92	124.36 +7.70	122.00 +4.99	123.85 +7.20	NS	NS	NS	1.50 NS

Key : NS - Not Significant; * - Significant at five per cent level;

** - Significant at one per cent level

TABLE XLII

RELATIONSHIP BETWEEN WORK OUTPUT OF TEXTILE WORKERS AND VARIOUS INFLUENCING FACTORS

Factors	Work output (mean values)				Critical difference			F value
	Low (n=41)	Medium (n=132)	High (n=27)	Total (n=200)	Low vs medium	Medium vs high	Low vs high	
1. Age (yrs)	32.95 +6.52	35.46 +8.56	35.85 +5.91	35.00 +7.90	NS	NS	NS	1.77 NS
2. Number of pregnancies	2.27 +1.29	1.89 +1.18	2.07 +1.00	1.99 +1.19	NS	NS	NS	1.71 NS
3. BMI	22.37 +2.61	23.74 +3.08	24.03 +2.21	35.50 +2.93	*	NS	*	4.10*
4. Haemoglobin (g/dl)	10.34 +0.87	11.69 +0.94	12.33 +0.68	11.50 +1.09	*	*	*	48.93**
5. Occupational diseases (No.)	3.05 +2.04	2.08 +1.66	2.00 +1.64	2.27 +1.78	*	NS	*	5.18**
6. Non-occupational diseases (No.)	2.05 +1.14	1.50 +1.06	1.22 +1.12	1.58 +1.12	*	NS	*	5.52**
7. Nutritional disorders (No.)	3.42 +1.76	1.30 +1.54	0.70 +1.14	1.66 +1.79	*	NS	*	35.34**
8. Blood Pressure-systolic (mm of Hg)	123.32 +7.41	123.74 +11.19	122.74 +12.86	123.52 +10.73	NS	NS	NS	0.11 NS

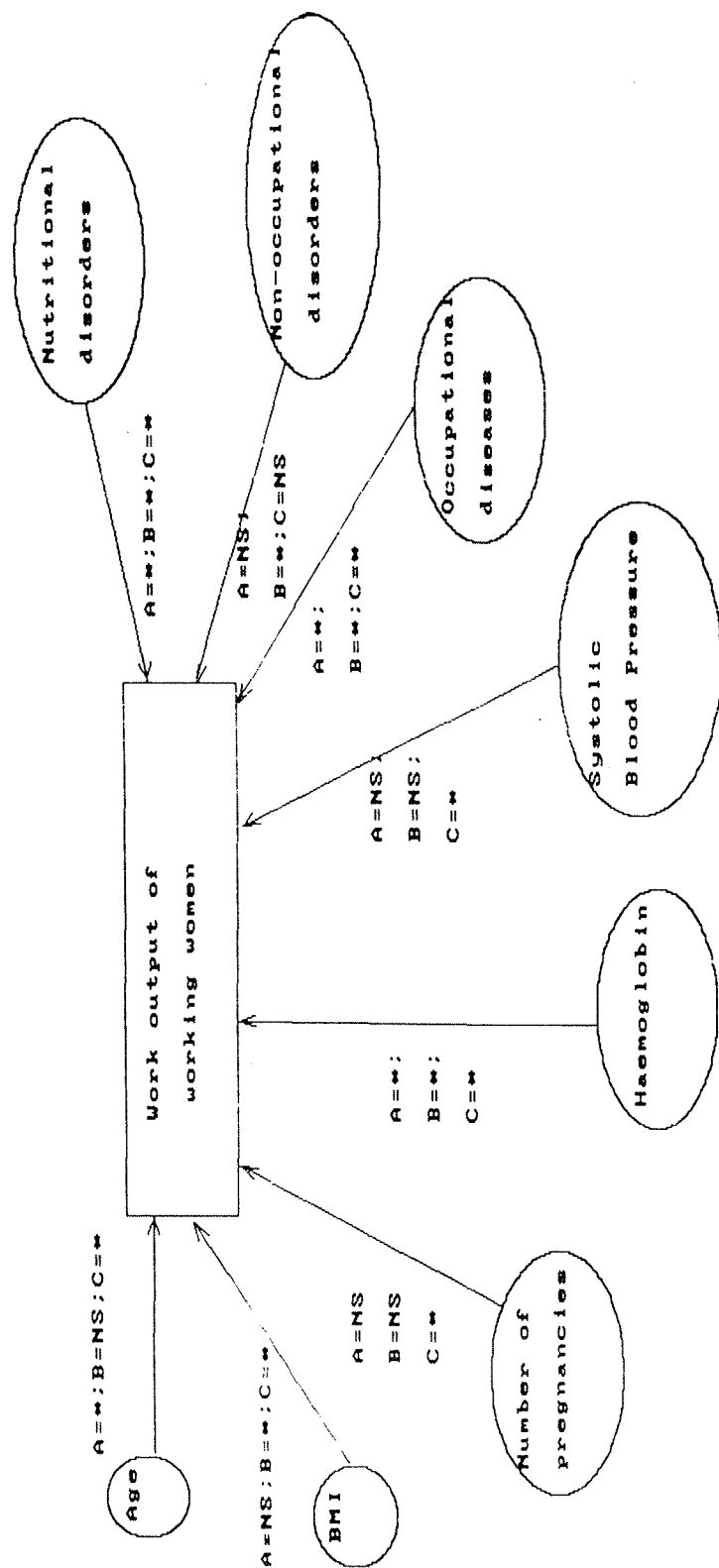
Key : NS - Not significant; * - Significant at five per cent level
 ** - Significant at one per cent level

TABLE XLIII

RELATIONSHIP BETWEEN WORK OUTPUT OF CLERICAL STAFF AND VARIOUS INFLUENCING FACTORS
(n=200)

Factors	Work output (mean values)			Critical difference			F Value
	Low (n=37)	Medium (n=131)	High (n=32)	Low vs medium	Medium vs high	High vs low	
1. Age (yrs)	23.54 +5.22	26.19 +6.93	34.41 +6.57	*	*	*	26.27**
2. Number of pregnancies	0.54 +1.07	0.84 +1.24	1.56 +0.98	NS	*	*	7.02**
3. BMI	20.20 +3.58	20.51 +3.67	22.19 +2.65	NS	*	*	3.43*
4. Haemoglobin (g/dl)	9.28 +0.71	12.06 +1.30	12.99 +1.06	*	*	*	104.25**
5. Occupational diseases (No.)	1.60 +1.32	1.15 +1.05	0.97 +1.18	*	NS	*	3.07*
6. Non-occupational diseases (No.)	1.65 +0.95	1.46 +0.95	1.28 +1.09	NS	NS	NS	1.24 NS
7. Nutritional disorders (No.)	2.89 +1.41	1.02 +1.21	0.38 +0.83	*	*	*	45.42**
8. Blood Pressure-systolic (mm of Hg)	119.24 +6.44	123.39 +12.89	124.97 +5.59	*	NS	*	2.71 NS

Key : NS - Not significant; * - Significant at five per cent level
** - Significant at one per cent level



Key: * - Significant at 5 per cent level

NS - Not Significant

RELATIONSHIP BETWEEN WORK OUTPUT OF WORKING WOMEN (Groups A, B & C) AND VARIOUS INFLUENCING FACTORS

FIGURE 16

The efficiency of construction workers was measured in terms of low, medium and high work output, corresponding to ≤ 93 , 94 to 191 and ≥ 192 number of bricks carried by a woman per day. The level by haemoglobin of the subjects was the strongest factor influencing their work output. For instance, group A women who had 10.07 ± 1.39 g/dl haemoglobin had low work output, being able to carry less than 93 bricks per day while, those with nearly normal value of haemoglobin (11.6 ± 1.33 g/dl) had higher work output of more than 192 bricks per day.

Two factors namely the incidence of occupational diseases and nutritional disorders, exerted their influence on work output, to a lesser extent (ie., between two sets of groups). For instance, women capable of only low work output, had far greater morbidity patterns (3.31 ± 1.64 and 3.06 ± 1.79 of occupational and nutritional disorders) than those doing high work output (2.63 ± 1.70 and 2.63 ± 2.05). Age, BMI, number of pregnancies, non-occupational diseases and blood pressure prior to commencement of work, did not have any significant effect on their work output.

The work output of group B (ie., textile workers) was classified as low, medium and high, depending on the number of spools of cotton yarn produced per day per worker (ie., low work output ≤ 29 spools, medium work output = 30 to 44 spools and high work output ≥ 45 spools).

There were significant associations between the BMI of women doing low (BMI = 22.37 ± 2.61), medium (23.74 ± 3.08) and high (24.03 ± 2.21) work output. Similar associations were noticed, with regard to haemoglobin level, number of occupational, non-occupational and nutritional disorders.

Age, haemoglobin level and nutritional disorders had a significant influence ($P < 0.05$) on the work output of group C women workers, while BMI, number of pregnancies, occupational diseases and systolic blood pressure, had lower impact on work output. The incidence of non-occupational health complaints was nearly the same among the women, irrespective of the type of work output. In accordance with a study by Satyanarayana (1989), the work efficiency increased from low to high, with a corresponding increase in BMI (ie., from 20.2 ± 3.58 for low work output to 22.19 ± 2.65 for high work output).

ANOVA test revealed that in each occupational group, there was a significant relationship between work output and various factors. With regard to age, as the women got older, their efficiency in typing improved and reached a peak in their mid-thirties. However a limitation of the study was that typists above 50 years of age were not available during the study. This might be due to their being promoted as public relations officers and senior clerks or dropping out of work. A high turn over of younger women in the typists' pool was a common occurrence in offices.

The blood pressure levels of subjects in group C, were significantly lower ($P < 0.05$) than groups A and C. The work efficiency percentage scores of group C women fell significantly ($P < 0.01$), with a decrease in haemoglobin levels (ie.,) from 12.99 ± 1.06 g/dl for high work output to 9.28 ± 0.72 g/dl for low work output.

The higher incidence of occupational diseases (1.6 ± 1.32) might be responsible for lower work output. Similarly, women having 2.89 ± 1.41 nutritional disorders, had lower work output than those with 0.38 ± 0.83 nutritional disorders.

Working with physical hazards for many years reduces the productive capacity of workers, especially women. This was reflected in the study by Anbu (1987) in whose study only half of the young weavers aged 20 to 30 years had the capacity of weaving at the maximum level, ie., 12 yards whereas nobody from the age group of 60 to 70 had the capacity to weave even eight yards per day. The respondents attributed their low production capacity to age and also monotonous nature of work, without any facilities.

3. Interaction between various factors with respect to occupational classification and degree of anaemia

The effect of various factors on the entire population with respect to occupational classification and degree of anaemia (two-way interactions) is presented in Table XLIV and Figure 17.

TABLE XLIV
INTERACTION BETWEEN VARIOUS FACTORS WITH RESPECT TO OCCUPATIONAL
CLASSIFICATION AND DEGREE OF ANAEMIA

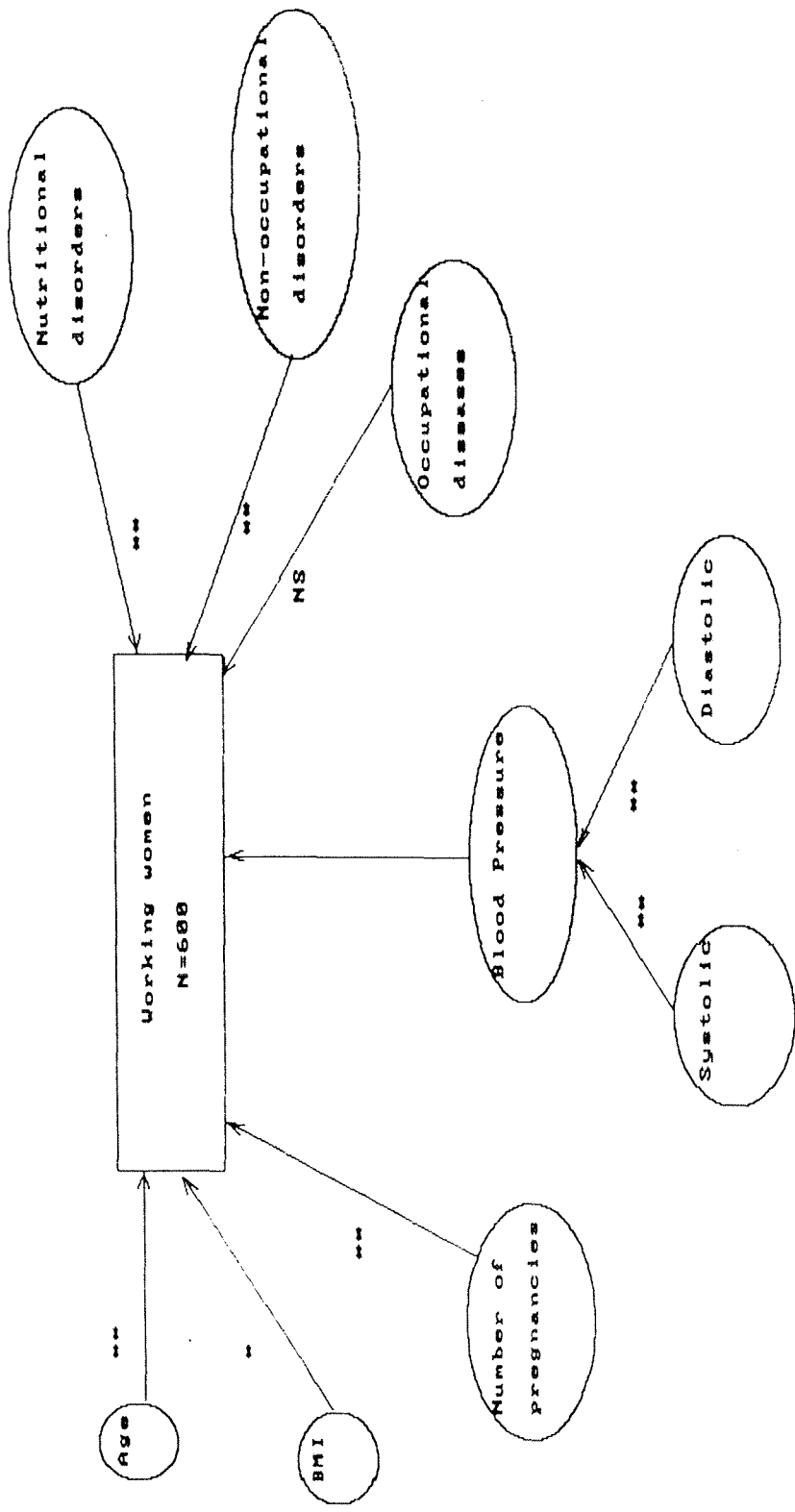
(n=200/group)

S.No.	Influencing Factors	Degree of anaemia				F value	
		Work Groups	Moderate Anaemia	Mild Anaemia	Normal Hb		
1.	Age in (yrs) [\bar{X} = 32.2]	A	36.15	35.07	32.58	4.296**	
		B	36.28	34.88	34.86		
		C	23.95	25.76	28.63		
2.	Number of Pregnancies [\bar{X} = 1.78]	A	2.66	2.51	2.10	6.016**	
		B	2.50	2.02	1.85		
		C	0.36	0.71	1.17		
3.	BMI [\bar{X} = 21.84]	A	20.41	21.41	22.20	2.908*	
		B	24.17	23.35	23.53		
		C	18.98	20.91	21.32		
4.	Occupational Diseases (No.) [\bar{X} = 2.03]	A	3.14	2.69	1.93	1.23 NS	
		B	3.17	2.54	1.76		
		C	1.50	1.51	0.98		
5.	Non-occupational Diseases (No.) [\bar{X} = 1.63]	A	2.37	1.87	1.24	6.116**	
		B	2.28	1.94	1.00		
		C	1.61	1.54	1.38		
6.	Nutritional Diseases (No.) [\bar{X} = 1.85]	A	4.32	2.54	0.68	4.165**	
		B	3.78	2.37	0.37		
		C	2.98	1.71	0.45		
7.	Blood Pressure (mm of Hg)	a) Systolic [\bar{X} = 123.41]	A	124.94	123.90	122.46	4.221**
			B	125.89	125.20	121.05	
			C	120.82	120.85	124.38	
		b) Diastolic [\bar{X} = 80.13]	A	80.46	80.00	79.95	3.664**
			B	81.22	80.55	80.12	
			C	78.93	79.68	80.17	

NS - Not Significant

* - Significant at five per cent level

** - Significant at one per cent level



Key: * - Significant at 5 per cent level; ** - Significant at 1 per cent level
 NS - Not significant

EFFECT OF VARIOUS FACTORS ON THE POPULATION OF WORKING WOMEN WITH RESPECT TO OCCUPATIONAL CLASSIFICATION AND DEGREE OF ANAEMIA (Two-way interaction)

FIGURE 17

The age, number of pregnancies, incidence of non-occupational and nutritional disorders, systolic blood pressure and diastolic pressure were significantly different ($P < 0.01$) among all the sub-groups (ie., occupational groups A, B and C were further divided into normal, moderately and mildly anaemic groups). Younger women (23.95 years) of group C and slightly older women of group A (36.15 years) and group B (36.28 years) were moderately anaemic.

Women of groups A, and B with normal haemoglobin levels experienced fewer number of pregnancies (2.10 and 1.85 respectively) in comparison with those who were moderately anaemic (A = 2.66 and B = 2.50). In contrast, women of group C had decreasing reproductive performance (0.36 number of pregnancies) as the intensity of anaemia increased.

In general working women with low BMI were found to be moderately or mildly anaemic ($P < 0.05$), similar to studies by Florenio and Castillo (1980). The sole exception was the group B women who were moderately anaemic but had normal BMI of 24.17.

Though the morbidity pattern of occupational diseases increased with a fall in haemoglobin levels among the three occupational groups it was not statistically significant. But the incidence of non-occupational diseases and nutritional disorders decreased with higher haemoglobin levels. Among the three occupational groups with moderate

anaemia, groups A, B and C exhibited 4.32, 3.78 and 2.98 number of nutritional disorders respectively. In short, group A had the highest incidence of nutritional disorders with respect to haemoglobin levels and occupational classification.

H. Impact of Factors Causing Job Stress and their Effect on Food Consumption Practices

1. Scores indicating the impact of job stress

On the subsample of 60 working women, two rating tests were performed to assess the total impact of the major factors causing job stress and the effect of job stress on food intake and consumption practices.

Table XLV presents the mean scores obtained by the three groups of subjects reflecting the total impact of the factors. The higher the scores, greater were the number and influence of factors leading to stress.

TABLE XLV
MEAN SCORES INDICATING THE IMPACT OF JOB STRESS

(n=20/group)				
Group	Mean Rating Score	Critical Difference		
		A vs B	B vs C	A vs C
A	20.00 \pm 2.66			
B	14.80 \pm 3.76	*	*	*
C	9.20 \pm 3.97			
Mean score 14.67 \pm 5.63				

Analysis of Variance

Source	Degrees of freedom	Sum of squares	Mean squares	F value
Between groups	2	1166.9333	583.4667	47.35**
Within groups	57	702.4000	12.3228	
Total	59	1869.3333		

Note : * Significant at five per cent level
 ** Significant at one per cent level

Heavy work load, poor rate of pay and hazardous work environment were the major components of work stress, as reported by group A women. Women of group B also listed heavy work load as a major cause of stress but that exposure to hazardous work environment was of greater impact on their physical and mental well-being. Increasing production targets and working double shifts, which were cited as strong contributors of job stress, may in fact, affect the (systolic) blood pressure levels of the textile workers.

Though women of group C also voiced the same complaints (heavy work load and low pay scales), their mean scores were much lower than those of groups A and B indicating lesser influence of the factors. Table XLV also reveals that group A women workers had the highest mean score (20.2 ± 2.66), followed by women of group B (14.8 ± 3.76) and group C with the least mean scores (9.2 ± 3.97). Analysis of variance (ANOVA) and critical difference tests proved that there was significant difference ($P < 0.05$) between the three groups.

Similar results were reported by Capel and Gurnsey (1987), Garg (1988), Kuruvilla (1989), Senthilkumari (1992) and Rao (1993).

2. Effects of job stress on food consumption patterns of working women

Table XLVI presents the mean scores obtained by the subjects for their food habits and to assess the effect of work stress on food intake and consumption practices. The higher the scores, greater were the changes in the regular food habits leading to poor food consumption.

TABLE XLVI
EFFECT OF WORK STRESS ON FOOD INTAKE

Group	Mean rating score	Critical difference		
		A vs B	B vs C	A vs C
A	22.80±2.40			
B	15.40±3.41	*	*	*
C	7.80±2.63			
Mean score	15.35±6.78			

Analysis of Variance

Source	Degrees of freedom	Sum of squares	Mean squares	F value
Between groups	(3-1)=2	2250.30	1125.1500	139.01**
Within groups	(60-3)=57	461.35	8.0939	
Total	(60-1)=59	2711.65		

Note : * Significant at five per cent level
** Significant at one per cent level

High intakes of tea, coffee and other beverages (like soda), absence of meal planning, irregular meal times, frequent use of tobacco as a stimulant, low intake of leafy vegetables, frequent skipping of meals (like breakfast/lunch), were the major effects of work stress as expressed by group A women. Group B women reported high intakes of tea and coffee, irregular and hurried meals, and low intake of greens; group C women reported high intakes of tea and coffee and snacks during mid-morning and tea breaks. Group A had a mean score of 22.80 ± 2.40 , followed by group B (15.45 ± 3.41) and group C (7.80 ± 2.63). Hence of the three groups, members in group C could follow better food habits than the other two groups. ANOVA test and critical difference (Multiple range test - LSD procedure) revealed that there was a significant difference between the mean scores of the three groups (A vs B, B vs C and A vs C) at five per cent level. Similar results were repeated by Sen (1980) and Herbert (1994).

3. Inter-relationship between causes of work stress and their effect on food intake/consumption practices of working women

Table XLVII presents the interrelationship between work stress scores and scores received for their food habits.

TABLE XLVII
INTERRELATIONSHIP BETWEEN FACTORS CAUSING JOB STRESS AND
THEIR EFFECT ON FOOD INTAKE OF WORKING WOMEN

Criteria	Values
Total number of working women studied (ie., sub-sample of groups A, B and C)	60
Mean score for factors causing job stress	14.67 \pm 5.63
Mean score for effect of job stress on food intake	15.35 \pm 6.78
Two-tail correlation probability	0.879**
t-value	1.63
Degrees of freedom	59
2 tail-correlation probability	0.109 NS

Note : ** Significant at one per cent level
 NS - Not significant

Using paired sample t-test it was revealed that there was no significant difference between rating scale scores attributed to work stress and food intake. By conducting a 2-tail correlation probability test it was brought to light that there existed a positive correlation ($r = 0.879$) at one per cent level between scores of Table XLVI and Table XLVII, ie., as work stress increased, it's impact on food intake also increased in a parallel manner.

Karasek (1981) and Capel and Gurnsey (1987) had reported that stress is implicated in many food related disturbances ranging from extreme over-eating, duodenal ulcers, to anorexia nervosa. Mild stress can be linked with finicky eating or the total loss of appetite. But the personal nature of stress causes one person to fast but another to eat in excess. The neurotransmitter noradrenaline could have a role in maintaining appetite. The answer is to set regular times for eating nutritionally balanced diets and to eat slowly.

Stressed persons tend to sleep less, exercise less, have poor diets, smoke more and use alcohol and other drugs more often than non-stressed people. These behaviours have all been shown to affect the immune system (Herbert, 1994).

These findings call for the need to appoint social counsellors and nutritionists in industrial settings to help employees develop the capacity to cope with job demands and rectify faulty eating habits, for better health and work performance.

I. Health Index of Working Women

Health Indices were prepared using multivariate linear regression analysis in order to predict the possibility of occurrence of occupational, non-occupational and nutritional disorders, with main emphasis on age, level of haemoglobin

and BMI of the women. The effect of other influencing factors such as educational status, family, income, age at menarche and at pregnancy, (total) number of pregnancies, blood pressure and pulse rate, was also studied and was not found to significantly affect the incidence of the three disease categories. However, these effects were also included in the model for predicting the morbidity pattern, using age, degree of anaemia and BMI (Table XLVIII).

(Table XLVIII Contd...)

Criteria		Health Index for											
		Group A				Group B				Group C			
Age in Years	Level of Haemoglobin	Occupational diseases	Non-occupational diseases	Nutritional disorders	Occupational diseases	Non-occupational diseases	Nutritional disorders	Occupational diseases	Non-occupational diseases	Nutritional disorders	Occupational diseases	Non-occupational diseases	Nutritional disorders
40-49	a) Normal	2.49 ± 0.22	1.48 ± 0.19	1.27 ± 0.34	1.79 ± 0.60	1.22 ± 0.38	0.93 ± 1.14	1.06 ± 0.25	1.48 ± 0.40	0.40 ± 0.68	1.31 ± 0.22	1.41 ± 0.19	1.97 ± 0.22
	Underweight	-	-	-	-	-	-	-	-	-	-	-	-
	Overweight	2.73 ± 0.12	1.03 ± 0.07	0.41 ± 0.10	1.89 ± 0.41	1.18 ± 0.17	0.76 ± 0.41	1.22 ± 0.32	1.65 ± 0.47	0.47 ± 0.15	-	-	-
b) Mild anaemia	Normal	3.02 ± 0.40	1.84 ± 0.26	2.45 ± 0.78	2.44 ± 0.79	1.87 ± 0.64	2.14 ± 1.34	-	-	-	-	-	-
	Underweight	3.17 ± 0.30	2.42 ± 0.18	4.28 ± 0.14	-	-	-	-	-	-	-	-	-
	Overweight	2.70 ± 0.21	1.79 ± 0.14	2.52 ± 0.66	2.89 ± 0.61	1.80 ± 0.51	2.10 ± 1.21	-	-	-	-	-	-
c) Moderate anaemia	Normal	3.41 ± 0.31	2.36 ± 0.23	4.45 ± 0.63	2.89 ± 0.68	1.76 ± 0.23	2.10 ± 0.81	1.90 ± 0.21	1.93 ± 0.07	3.26 ± 0.58	1.90 ± 0.21	1.93 ± 0.07	3.26 ± 0.58
	Underweight	3.77 ± 0.23	2.68 ± 0.39	5.65 ± 0.34	-	-	-	-	-	-	-	-	-
	Overweight	-	-	-	1.81 ± 0.73	1.47 ± 0.55	1.68 ± 1.44	1.52 ± 0.12	1.91 ± 0.07	1.86 ± 0.46	-	-	-
50-59	a) Normal	-	-	-	2.46 ± 0.86	2.00 ± 0.73	2.92 ± 1.84	-	-	-	-	-	-
	Underweight	-	-	-	-	-	-	-	-	-	-	-	-
	Overweight	2.71 ± 0.16	1.54 ± 0.09	1.84 ± 0.41	1.63 ± 0.21	0.94 ± 0.35	0.06 ± 0.27	-	-	-	-	-	-
b) Mild anaemia	Normal	3.05 ± 0.18	2.17 ± 0.12	3.34 ± 0.83	2.23 ± 0.51	1.36 ± 0.38	1.28 ± 1.15	-	-	-	-	-	-
	Underweight	-	-	-	-	-	-	-	-	-	-	-	-
	Overweight	3.31 ± 0.21	1.95 ± 0.18	3.10 ± 0.06	2.15 ± 0.29	1.72 ± 0.07	2.20 ± 0.14	-	-	-	-	-	-
c) Moderate anaemia	Normal	3.83 ± 0.29	2.34 ± 0.18	4.83 ± 0.55	-	-	-	-	-	-	-	-	-
	Underweight	3.83 ± 0.71	2.71 ± 0.48	5.63 ± 0.76	-	-	-	-	-	-	-	-	-
	Overweight	-	-	-	-	-	-	-	-	-	-	-	-

Note: '-' indicates non-availability of subjects in the cells

The Health Index of group A (Table XLVIII) clearly predicts that, as anaemia sets in, greater number of diseases are likely to affect all age groups of working women. For instance, group A women aged 20-29 years, with normal BMI, and normal haemoglobin levels (of $\geq 12\text{g/dl}$) had a disease incidence of 1.66 ± 0.34 ; 1.28 ± 0.18 and 0.53 ± 0.47 of occupational, non-occupational and nutritional disorders. But women of the same age group and BMI level, with mild and moderate anaemia had progressively higher incidence of occupational diseases (2.24 ± 0.28 and 2.73 ± 0.35 ; non-occupational diseases (1.73 ± 0.23 and 2.18 ± 0.21) and nutritional disorders (1.88 ± 0.8 and 3.88 ± 0.56). The incidence of non-occupational and nutritional disorders had an inverse relationship with BMI of group A women, but the effect of BMI on the incidence of occupational diseases was not very clear. This may be due to inadequacy of sample size, after dividing into many sub-groups and there may be other factors which may have a bearing on disease incidence. For example, underweight group A women aged 40 to 49 years with mild anaemia, were more susceptible to occupational diseases (3.17 ± 0.3), non-occupational diseases (2.42 ± 0.18) and nutritional disorders (4.28 ± 0.14) than women of the same category who were normal or overweight (3.02 ± 0.40 and 2.70 occupational diseases; 1.84 ± 0.26 and 1.79 non-occupational disorders respectively).

In general, as construction women workers grow older, after reaching a peak work output in their mid-thirties, the continued exposure to occupational hazards takes its toll on their health status. They become more vulnerable to occupational, non-occupational and nutritional disorders, as they approach menopause. Though age, BMI and presence of anaemia have the major influence on susceptibility to diseases, other minor factors (previously stated) also exert considerable effect on morbidity pattern of group A women. This is supported by findings given in Table L and a longitudinal study conducted by NIN (1993) which showed a high correlation between the nutritional status of adults, (as measured by BMI) and mortality.

Women of group B, less than 30 years of age, with normal BMI of 18.5 to 24.9 and free from anaemia, were affected by the least number of occupational diseases (1.94 ± 0.53), non-occupational diseases (1.22 ± 0.45) and nutritional disorders (0.83 ± 1.09), than underweight and moderately anaemic women of the same age category, (3.01 ± 0.52 - occupational diseases, 2.38 ± 0.96 non-occupational diseases and 3.01 ± 1.54 nutritional disorders).

The incidence of occupational and non-occupational diseases among all the age groups of group C women were nearly the same (ie.,) one to two disorders, but the incidence of nutritional disorders was more among women in their mid-thirties. Similar to groups A and B, women of

normal BMI and haemoglobin values had fewer health complaints than those who were anaemic and underweight. Women aged 30 to 39 years, with normal haemoglobin level and BMI would have 1.33 ± 0.40 occupational diseases, 1.58 ± 0.35 non-occupational diseases and 1.28 ± 1.11 nutritional disorders. But women of the same age group who were underweight, would have a slightly higher incidence of non-occupational diseases (1.74 ± 0.59) and nutritional disorders (2.09 ± 1.23).

It has been shown that the acute malnutrition associated with disease is accompanied by changes in the ratio of slow to fast muscle fibres due largely to a decline in the number of the latter (Lopes et al., 1982).

The findings of the present investigation revealed that malnourished, especially underweight, anaemic women doing stressful jobs had significantly lower work capacities and work outputs. It has also brought to light the occupational, non-occupational and nutritional hazards affecting the health of the women involved in various categories of occupation and the host of factors influencing the occurrence of the above hazards. It could be concluded that if adequate nutrition components are included in the OHS and implemented effectively among all sectors of occupational groups, it will promote the health and work output of women in the long run.

Summary and Conclusion

V. SUMMARY AND CONCLUSION

Women today, exert an undeniably strong influence in a nation's economy and development as their contribution is in the form of economically productive, socially productive and reproductive labour. In India, the entry of women in the work arena, has resulted in socio-economic improvement of women and their families and community at large; but it also has brought to focus several unanswered and often neglected questions, such as the impact of work environment on their health and nutritional status; effect of maternal employment on infant weaning practices and child care and supportive legislation and adequacy of Occupational Health Services (OHS) in meeting the special needs of women workers. Hence the present investigation namely, 'Health and Nutritional Status of Selected Working Women in Coimbatore and their Exposure to Occupational Hazards' was undertaken.

A total of 600 working women, 200 each of construction workers (group A), textile workers (group B) and clerical staff (group C) was selected as the sample, by *quota or cluster* sampling technique. Information on their socio-economic background, work profile, food consumption practices, reproductive profile, effect of employment on child care and effectiveness of existing OHS was collected using two specially formulated interview schedules. Their

health and nutritional status were assessed by clinical examination and using medical records. Sub-samples of 20 women from each group were selected and biochemical estimations and a three-day food weightment study were conducted.

The findings of this investigation are summarised below:

1. The women of groups A, B and C were aged 34.60 ± 9.6 , 35 ± 7.9 and 27 ± 7.4 years and months respectively.
2. Most of the families of group A (77.5 %) were below the poverty line, earning less than Rs. 1,500 per month. Group B families (97.5 %) earned much more (Rs. 4347.92 ± 823.84 /month) than groups A (Rs. 1541.06 ± 345.71) and C (Rs. 3209.50 ± 878.48 /month). Women of groups of A, B and C contributed to 36.56, 46.66 and 30.25 per cent to their total family income.
3. Construction work was unorganised, seasonal and migratory by nature, involving strenuous muscular effort in hazardous work conditions. Majority of the women of this group were illiterate (73 %), unskilled and poorly paid casual labourers. Textile (spinning) workers were semi-skilled and organised, with middle school education (57.5 %). Clerical staff were skilled with basic college/diploma education (91.5 %), with relatively hazard free work environment.

4. Group A women spent the maximum time at work in a day (11.18 ± 2.43 hrs and mts), followed by group B (9.28 ± 2.46 hrs and mts) and group C (7.27 ± 0.18 hrs and mts) workers.
5. Economic reasons (72.7 %) and need for better social recognition (53 %) were the reasons for undertaking employment by the subjects.
6. Strenuous muscular work, repetitive manual tasks and high production targets were the problems at work, expressed by group A workers. Repetitive manual tasks, poor health and sustained concentration/skill demands were voiced by group B while, nearly 40 per cent of group C workers were free of problems.
7. Of the work facilities provided at the work spot, only group B benefited from Employees State Insurance (ESI) Scheme, which unfortunately was only curative and not preventive in nature.
8. Majority (90 %) of the women (groups A, B and C) were fully involved in household activities like cooking, while women of groups B and C were only partially involved in other household activities.
9. Habitual use of alcohol was observed among four and two per cent of the population in groups A and B respectively. Tobacco in the form of 'beedi' or 'betel quid' was commonly consumed by 44 and 33 per cent of subjects in groups A and B respectively.

10. The working women mainly consumed a rice-based diet and over 60 per cent were non-vegetarians. The diets of group A women were poor in quantity and quality; the intake of protective foods like green leafy vegetables, milk, other vegetables and fruits was grossly deficient when compared to the ICMR suggested food allowances. The diets of groups B and C were adequate, except for green leafy vegetables and fruits.
11. The diets of the women of group A were grossly deficient in iron (by 42 %), vitamin C (by 47.5 %) and moderately deficient in B-complex vitamins (by 26.4 %), protein (by 26.1 %), beta-carotene (by 24.4 %) and calcium (by 17.1 %). Women of group C consumed diets that were adequate in all nutrients except for iron (66.9 % of the RDA). In contrast, women of group B had adequate nutrient intakes except for iron (73.6 % of the RDA).
12. The mean heights of women in groups A, B and C were 153.88, 154.26 and 154.11 cm; mean weights were 50.41, 55.92 and 49.21 kg; and the BMI values were 21.29, 23.50 and 20.72 respectively.
13. Anaemia was the major nutritional deficiency affecting 70.5 per cent of group A, 58 per cent of group B and 42.5 per cent of group C women.

14. A highly positive correlation was found between iron intake and haemoglobin levels of the working women ($r=0.916$).
15. Regarding reproductive performance, more than 95 per cent of women of groups A and B, and 60 per cent of group C were married. The mean ages at menarche and first pregnancy for the entire sample were 12.69 ± 1.61 and 20.68 ± 3.04 years and months, respectively. Women of group A married much earlier (ie., below 17 years of age) than the group B (20.52 yrs.) and group C (23.74 yrs.) women.
16. Women of group C were the least affected by reproductive health problems (71 %) in contrast to women of groups B (45 %) and A (36.5 %). Statistically significant associations ($P < 0.01$) were found to exist between the incidence of reproductive health complaints and BMI; occupational diseases ($\chi^2= 164.53$) and nutritional deficiencies ($\chi^2= 177.91$).
17. Sixty eight per cent of group A women took their children to their worksite due to poor family support and lack of creches/child care facilities. Women of groups B and C weaned their infants much earlier (3.41 ± 2.23 and 3.64 ± 2.45 months) than group A (4.53 ± 2.83 months) because they had to return to their jobs, where they did not have creches.

18. Ill-health (53.3 %) and care of sick children and family members (20.8 %), were the two main reasons for absenteeism from work.
19. When the provision of work facilities as per OHS legislation was poor, the incidence of occupational diseases was found to be high. Similar associations ($P < 0.01$) were found between age/income/literacy status and incidence of diseases. As the age increased, beyond 35 years, their susceptibility to diseases increased. With an increase in income and literacy, the number of diseases affecting them were fewer, indicating better enforcement of OHS facilities and shifts to better and safer jobs.
20. Analysis of variance test stressed the fact that as the degree of anaemia increased, it was accompanied by a decrease in work output ($P < 0.01$). Women of groups A, B and C with normal level of haemoglobin (ie., ≥ 12 g/dl) could carry 163.51 ± 48.08 bricks; produce 41.44 ± 5.50 spools of cotton yarn and have a typing score of 89.37 ± 6.85 per cent respectively. But women with mild anaemia (≤ 9 g/dl) could carry only 123.61 ± 44.03 bricks; produce 29.11 ± 6.44 cotton spools and scored 64.16 ± 10.5 per cent in the three groups respectively.
21. BMI, number of pregnancies, incidence of occupational and non-occupational diseases and nutritional

disorders, blood pressure and pulse rate were influenced by the degree of anaemia ($P < 0.01$) and work output among the women studied.

22. Two-way interaction between the three occupational groups A, B and C and the anaemic groups - normal, mildly and moderately anaemic, revealed that as the job became more strenuous and hazardous, women with lower haemoglobin levels were more susceptible to a higher number of nutritional disorders.
23. The trend curve revealed that each year, the number of factory workers including textile workers undergoing treatment for occupational health complaints is on the rise.
24. The Health Index predicts a rise in occupational and non-occupational and nutritional disorders, with an increase in age, exposure to occupational hazards, increase in the degree of anaemia and lowering of BMI values (< 18.5).

In conclusion, it may be stated that nutritional, socio-economic and occupational factors play significant roles in the morbidity pattern of working women. Different occupations pose different occupational threats to the workers, especially women. Group A women are more prone to occupational and nutritional disorders. Though group B women were less literate than group C women they had higher

incomes and better work facilities in the form of ESI health scheme; nevertheless most of them suffered from respiratory problems and mild anaemia because of the hazardous nature of their work. Group C women who were more literate than those of the other groups, were exposed to fewer occupational hazards and hence were affected by fewer diseases.

The findings of this investigation have brought to light the need for including nutrition education in the OHS legislation and its implementation. The health index which was evolved for the first time can be used as a ready reckoner to predict the health and nutritional problems faced by women involved in different sectors of occupation and implement the necessary ameliorative steps.

Recommendations

Based on the findings, it is recommended that in OHS, the nutritional component has to be spelt out and implemented. Comprehensive health/nutritional evaluation and education programmes need to be implemented, especially for construction and textile women workers.

The lines for further research are listed as follows:

To,

1. formulate nutrient enriched snacks or special diets, distribute through industrial canteens and study the

Bibliography

BIBLIOGRAPHY

- Aggarwal, A. (1986) "Women and Natural Resources", Social Action, 35 (4), pp. 301-325.
- Ahlborg, G. and Bodin, L. (1991) "Tobacco Smoke Exposure and Pregnancy Outcome Among Working Women", Am. J. Epidem., 133 (4), pp. 338-347.
- Anbu, S. (1987) "Health Profile of Women Weavers of Worayur, Trichy District", Doctoral Thesis Abst., Bharathidasan Univ., pp. 24-40.
- Babu, V.S.R. (1989) "Working Women and Children in Resettlement Colonies of Delhi", Social Welfare, 25 (12), pp. 15-16.
- Backyavathy, D.M., Nandakumar, N.V. and Bhaskar, E. (1987) "Incidence of Respiratory Diseases in Workers Exposed to Tannery Occupational Environment", Arogya, 13 (2), pp. 65-134.
- Baker, E.M. (1991) "Experimental Scurvy in Man", Am. J. Clin. Nutr., (23), pp. 43-54.
- Barathan, D. (1992) "Stress Management", Social Welfare, 25 (2), p. 40.
- Baskar, P.W. (1994) "Serum Lipoprotein and Total Cholesterol Profile of Young Smokers and Non-Smokers", Nutrition, NIN, pp. 5-8.
- Belavady, B. (1980) "Breast Feeding Practices Among Women in Andhra Pradesh", Proc. NSI, (26), NIN Hyderabad, pp. 39-47.
- Bennett, L. (1988) "The Role of Women in Income Production and Intra-household Allocation of Resources as a Determinant of Child Nutrition and Health", Food Nutr. Bulletin, 10 (3), 16-29.
- Bergstrom, G. (1985) "Report on Women's Occupations in India", ISDA, ISST, Stockholm, March-May, pp. 176-201.
- Bernard, R.J. (1991) "Effects of Life Style Modification on Serum Lipids", Archives Int. Med., 15 (7), pp. 1389-1396.

- Bhawani, M.L. and Sharada, D. (1989) "Nutritional Quality of the Foods Given During Menarche", Ind. J. Nutr. Dietet., 24 (6), pp. 170-174.
- Bihari, V., Srivastava, A.K., Gupta, B.N., Sharma, R.P. and Lal, M.M. (1992) "Noise Induced Hearing Loss Among Employees of a Paper Mill", Ind. J. Environ. Prot., 34 (2), pp. 114-121.
- Brown, C.T. and Harris, P. (1980) "Worker Absenteeism", Ind. J. Environ. Prot., 21 (7), pp. 51-53.
- Bush, T.L., Fried, L.P. and Connor, B.E. (1988) "Cholesterol, Lipoproteins and Coronary Heart Diseases in Women", Clinical Chemistry, 34 (8), pp. 1360-1370.
- Capel, I. and Gurnsey, B. (1987) "Managing Stress", 4th Edn., Constable and Co. Ltd., London, WC. 2117 EG, UK, pp. 172-204.
- Census of India (1991) "Provisional Population Totals", Series - I, Paper - I of 1991 Census, Amulya Ratna Nanda, Registrar General and Census Commissioner of India, Govt. of India, pp. 25-26.
- Chandra, S.K. and Lakshmiswaramma, N. (1991) "Working Problems and Infant Feeding", Social Welfare, 38 (2), pp. 11-14.
- Chatterjee, M. (1993) "Occupational Health of Self Employed Women Workers", Health for the Millions, 1 (2), pp. 13-17.
- Cherian, S., Gandhi, M. and Khopkar, S.M. (1992) "Chemical Speciation, Characterisation and Impact of Metal Pollutants on Health from Aerosols", Ind. J. Environ. Prot., 12 (5), pp. 324-328.
- Department of Inspectorate of Factories (1995) "Importance of Industrial Safety Training", Report of the Dept. of Inspectorate of Factories and Coimbatore Action Centre of the National Safety Council, Coimbatore, pp. 14-20.
- Devadas, R.P., Chandrasekhar, U. and Bhooma, N. (1982) "Nutritional Outcome of a Rural Diet Supplemented with Low Cost Locally Available Foods - I, Impact on Expectant Women", Ind. J. Nutr. Dietet., 19(4), pp. 111-116.

- Devadas, R.P. (1988) "Nutritional and Physical Performance of Selected People Involved in Certain Activities", Proc. NSI, (34), pp. 35-42.
- Devadas, R.P. (1990) "Nutrition of Women in India", Abst. from Women and Nutrition in India, Nutrition Foundation of India by C. Gopalan, NIN, pp. 1-17.
- DEW (1986) "Women in Tamil Nadu : A Profile", Tamil Nadu Corporation for the Development of Women Ltd., Madras, pp. 7-13.
- ESI (1989) "Report of the Director General of the ESI Corporation", ESI Medical Manual, New Delhi, Third Edn., pp. 3-126.
- Florenio, C.A. and Castillo, C. (1980) "Working Efficiency and Nutritional. Personal and Work Related Factors", Philippine J. Nutr., 33 (4), pp. 179-182,
- Francis, J. (1992) "Occupational Hazards - The Need for Adequate Legislation and Strict Implementation", Health Action, 5 (4), p. 3.
- Garg, A. (1988) "Family Under Stress : Doubly Enslaved", Social Welfare, 35 (5), pp. 24-27.
- Garg, N. (1990) "Career Women Need the Support from the Family", Social Welfare, 36 (9), pp. 6-7.
- Ghodasara, N.B., Rathod, R.A. and Parikh, D.J. (1992) "Environmental Dust Hazards and its Control in Small Scale Slate - Pencil Industry", Ind. (1992) J. Env't. Prot., 12 (1), pp. 50-53.
- Ghosh, S. (1991) "Working Mothers", You and Your Child, Rev. Edn., Voluntary Health Association of India, pp. 37-40.
- Goel, M., Saxena, N., Nagar, D., Jagannathan, J., Verma, D., Gunasekaran, N. and Kapil, U. (1994) "Nutritional Status, Nutrient Intake and Chronic Energy Deficiency Amongst Under-privileged Adult Population in Different Occupational Categories in Rural Rajasthan", Abst. Sci. Sess. XXVII Ann. Meetg. NSI, Hyderabad, p. 47.
- Gopalan, C. (1993) "Recent Trends in Nutrition", Oxford University Press, New Delhi, pp. 16-37.
- Government of India (1992) "Statistical Records 1990-1992", Govt. Statistical Centre, Coimbatore, pp. 3-14.

- Gupta, P.A. and Rastogi, S.K. (1988) "Occupational Health Hazards in Beedi Making Industries", Ind. J. Occpl. Hlth., 31 (3 & 4), pp. 61-67.
- Gupta, S.P. (1991) "Statistical Methods", 26th Edn., Sultan Chand and Sons Pub., New Delhi, pp. A.1.2-A.5.4.
- Guzman, M.P.E., Donato, D.S. and Agustin, C.P. (1988) "Nutrient Intake, Dietary Pattern and Food Habits of Central Textile Mill Workers", Philippine J. Nutr., 33 (4), 202-208.
- Herbert, T.B. (1994) "Stress and the Immune System", World Health, 2 (3 and 4), pp. 5-4.
- ICMR (1990) "Report on Ford Foundations Collaborative Study : An Investigation into Factors that Determine the Health Status of the Community", Proc. NSI, (36), pp. 42-46.
- ILO (1992) "Occupational Safety", Directive Principles and Implications", World Health, 3 (1), pp. 601-606.
- Immink, M.D.C. (1988) "Nutrition in Health and Disease and International Development", Symposia from the XII International Congress of Nutrition, New York, Proc. NSI, (34), pp. 43.
- International Nutrition Anaemia Consultative Group (1987) "Ironing out Anaemia", Iron Deficiency in Women, INACG Abst., April, pp. 4-57.
- Jayanthi, C.K. (1993) "Food Fads and Fallacies", The Hindu, Sept. 30th, (Suppl.), p. 7.
- Jayaraj, G. (1992) "How Does Your Factory Measure up in terms of OHS?", Health Action, 5 (4), pp. 23-25.
- Jelliffe, D.B. (1978) "Anthropometric and Clinical Assessment", WHO Bulletin, 64 (6), pp. 240-256.
- Johnson, B. (1989) "Carpal Tunnel Syndrome", Congressional Testimony of Barry L. Johnson, before the Sub Committee on Postal Personnel and Modernization, US House of Representatives, US Dept. of Health and Human Services, NIOSH, Ohio -45226, pp. 1-4.
- Joshi, V.M. (1988) "Nutritional Status of Oral Contraceptive Users", Proc. NSI, (26) pp. 52-54.

- Kamath, S.R. (1994) "Comparative Medical Impact Study of Viscose Rayon Workers and Adjoining Community in Relation to Accidental Leak", Chemical Engineering World, 29 (2), pp. 107-111.
- Kannan, S. and Lalitha, K. (1994) "Food Expenditure, Preparation and Consumption Patterns of Low Income Industrial Workers in Neyveli Lignite Corporation of India", Proc. XXVII Ann. Meetg. of NSI, Nov. 24-25, NIN, p. 46.
- Karasek, R., Baker, D., Mauxer, F., Ahlbom, A. and Theorell, T. (1981) "Job Decision, Latitude, Job Demands and Cardiovascular Disease : A Prospective Study of Swedish Men", Am. J. Public Health, 7 (1), pp. 694-705.
- Kaur, I.P. and Sood, B. (1988) "Dietary Pattern and Nutritional Status of Spinning Mill Workers", Ind. J. Nutr. and Dietet., 25 (3), pp. 315-319.
- Khan, M., Anand, S.T. and Patel, C.J. (1992) "Work Profile of Indian Women", ORG Report, New Delhi, pp. 42-50.
- Kochupara, J. (1992) "Occupational Hazards Versus Health Workers", Health Action, 5 (4), pp. 13-14.
- Kumar, N. and Kumar, S. (1988) "Anaemia and Women", Swasth Hind, 32 (7), pp. 182-186.
- Kuruvilla, J. (1992) "Occupational Stress in Nursing", Social Welfare, 25 (12), p. 12.
- Langmuir, A.D. (1976) "Modern Concepts of Surveillance", Int. J. Epidemiol., (5), pp. 13-18.
- Learmouth, A.T. and Akhtar, A. (1990) "Cultural Patterns and Processes : Wrong Notions About Food", Annual Souvenir of the Kovai Medical Centre and Hospital Ltd., Coimbatore - 48, pp. 2-3.
- Lopez, L.M. Masse, B. and Ryan, A.S. (1992) "Comparison of BMI and Cutoff Points for Estimating Over Weight in Hispanic Women", J. Am. Dietet. Ass., (92), pp. 1343-1347.
- Maini, P.S., Lamba, R.S. and Singh, M. (1980) "A Study of Etiological Factors in Osteoporosis Using Trabecular Pattern Index", National Institute Health Publication, 80 (8), pp. 412-416.

- Mascarenhas, M.M. (1988) "Women in Multiple Roles : Family Under Stress", Social Welfare, 35 (5), pp. 12-15.
- Mehta, P. and Bansal, N. (1985) "Study of Dietary Pattern of Manual Workers in Chicknvass Village of Hissar", Ind. J. Nutr. Dietet., 22 (8), pp. 243-245.
- Mohan, R. (1991) "Women in Agricultural Sector", Ind. J. Environ. Hlth., 44 (7), pp. 16-22.
- Mukherjee, A.G. (1991) "Environmental Pollution and Health Hazards : Causes and Control", Galgotia Pub., New Delhi, pp. 113-127.
- Mukherji, S. (1993) "Focus on Women", Social Welfare, 40 (7), pp. 23-27.
- Murthy, R.V. (1993) "A Round up on Research Activities", Nutrition, NIN, 27 (1), pp. 16-19.
- Murti, C.R.K. and Adhikari (1988) "Health Implications of Hazardous Waste Management", Ind. J. Environ. Hlth., 31 (1), pp. 1-10.
- Nag, A. (1994) "Women in Chemical Environment : Reproductive Hazard and Management", Ind. J. Soc. Work, 55 (3), pp. 161-171.
- Nair, N.V. (1992) "Heat, Dust, Chemicals and the Health of Workers in Industries", Health Action, 5 (4), pp. 15-17.
- Newman, J.W. and Beehr, T.A. (1979) "Personal and Organisational Strategies for Handling Job Stress : A Review of Research of Opinion", Personnel Psychology, (32), pp. 1-43.
- NIN (1989) "Nutritive Value of Indian Foods", NIN, ICMR, Hyderabad, pp. 1-46.
- NIOSH (1991) "Reproductive Health Hazards of Occupations", NIOSH Publications on Video Display Terminals (Rev.), NIOSH, Ohio - 45226, pp. 231-250.
- NNMB (1993) "National Nutrition Monitoring Bureau Report of Repeat Surveys (1992-93)", Nutrition Trends in India, NIN, Hyderabad, pp. 46-53.

- Pal, A.K., Pandey, M. and Mitra, H. (1992) "The Effect of Noise on Hearing Acuity with Respect to the Workers of Coal Washeries", Ind. J. Envt. Prot., (9), pp. 324-356.
- Park, J.E. and Park, K. (1989) "Occupational Health", Text Book of Preventive and Social Medicine, 12th Edn., Jabalpur, pp. 420-433.
- Parthasarathy, R. (1994) "Construction Work : a Cheerless Calling", The Hindu Oct., 8th, p. 5.
- Perumalsamy, T. (1985) "Female Work Participation Rate in Tamil Nadu", Economic Development of Tamil Nadu, S.Chand & Co. Ltd., New Delhi, pp. 22-35.
- Pesticide Action Network International (1992) "Occupational Exposure to Pesticides", Health Action, 5 (4), p. 11.
- Phyllis, S. (1991) "Women Labourers in Salt-Pans at Tuticorin", Social Welfare, 39 (2), pp. 15-16.
- Popkin, M., Barry, S. and Florentine, S. (1976) "Income, Time and the Working Mother and Child Nutrition", J. Trop. Pediat. Environ. Child Hlth., (22), pp. 165-172.
- Radha, N. and Palaniswamy, S. (1992) "Organising Women Labourers", Social Welfare, 39 (2), pp. 7-8.
- Rahamathullah, V. (1983) "Anaemia and Productivity Among Tea Plantation Workers in South India", Proc. NSI, (28), pp. 16-24.
- Rajagopalan, S. (1982) "Food and Nutrition Strategies for Achieving Health for all by 2000 A.D.", Proc. NSI, (14), pp. 38-50.
- Rao, P.S.S. and Samuel, L.K. (1980) "Rural - Urban Differentials in Female Fertility", Proc. NSI, (26), NIN, pp. 29-38.
- Rao, V.K. (1987) "Vital Statistics and Nutritional Status of Indians", Ind. J. Nutr. and Dietet., 24 (9), pp. 272-297.
- Rao, N.M., Parikh, J.R. and Kashyap, S.K. (1991) "Acute and Chronic Changes in Ventilatory Lung Function in Textile Workers", Ind. J. Environ. Prot., 11 (9), pp. 654-657.
- Rao, V.N. (1993) "Happy Worker, Healthy Worker", Social Welfare, 40 (2-3), p. 26.

- Roy, S.K. (1991) "Health Status of Oraon Tea Garden Labourers", Ind. J. Soc. Work, 11 (3), pp. 372-375.
- Sahu, S.K. and Das, N.C. (1992) "Breaking Stones to Make a Living", Social Welfare, 35 (2), pp. 30-31.
- Samuel, L.K. and Rao, P.S.S. (1992) "Socio-Economic Differentials in Mothers at Risk Based on Pre-Pregnancy Weights and Heights", Ind. J. Med. Res., 96 (B), pp. 159-167.
- Saraswathi, K. and Maheswari, V. (1994) "A Comparative Study on Socio-economic, Employment, Nutrition, Health Profile of Male and Female Workers in the Spinning Mills of Coimbatore - Tamil Nadu", Abst. Sci. Sessn. XXVII Ann. Meetg. NSI, (25), NIN, pp. 36-37.
- Satyanarayana, K. (1989) "Exercise and Physical Fitness", Nutrition, NIN, pp. 19-30.
- Satyanarayana, K. (1989) "Growth and Development and Physical Performance of Man in Under Nutrition - Social Dimension", Proc. NSI, (34), pp. 23-32.
- Schnorr, T.M., Barbara, A. and Halperin, W.E. (1989) "Video Terminal Display Terminals and the Risk of Spontaneous Abortion", Carpal Tunnel Syndrome - Selected References, NIOSH, Ohio, pp. 727-736.
- Schurch, B. and Scrimshaw, N.S. (1987) "Chronic Energy Deficiency Consequences and Related Issues", International Dietary Energy Consultancy Group, Background Papers and Working Group Reports Presented at an IDECG - Meeting, Aug., 3-7, in Guatemala City, pp. 8-192.
- Selvarani, S. (1992) "Handling Workplace Stresses", Health Action, 5 (4), pp. 4-9.
- Sen, B.R. (1980) "Nutrition and Working Efficiency", Basic No. 5, FAO Publications, Rome, pp. 3-41.
- Senthilkumari, M. (1989) "A Study of the Occupational Environment and the Status of Health in a Textile Industry in Madurai", J. Ind. Poll. Cont., 5 (2), pp. 72-78.

- Tiwari, D.N. (1987) "Health of Women", Victims of Environmental Crises, EBD Education Pvt. Ltd., G.G. Univ., Dehradun, U.P., pp. 156-163.
- Varley, H., Gomerlock, A.H. and Bell, M. (1980) "Standard Biochemical Procedures", Practical Clinical-Biochemistry, Vol. I, General Topics and Common Tests, and Common Tests, 5th Edn., William Heirremann Medical Books Ltd., pp. 650-669.
- Vijayalakshmi, P. (1987) "Anaemia and Work Output of Farm Women", Ind. J. Nutr. Dietet., 24 (9), pp. 253-259.
- Vimal, I.M.S. (1992) "Occupational Hazards in Agriculture", Health Action, 5 (4), pp. 10-12.
- Viteri, F.E. and Torun, P. (1981) "Considerations on the Effect of Nutrition on the Body Composition and Physical Work Capacity of Young Guatemalan Adults", Nutn. Absts. Rev., 8 (10), pp. 763-765.
- Vohra, R. and Geri, A.K. (1989) "Status, Education and Problems of Indian Women : A Complete Insight of Indian Women", Akshat Pubs. Delhi, Third Edn., pp. 53-57.
- Westrich, B.J. (1987) "Effect of Physical Activity on Skeletal Integrity and its Implications for Calcium Requirement Studies", Nutrition and Health, 5 (1 & 2), pp. 53-60.
- WHO (1982) "The Work Environment", Health Hazards of the Human Environment, WHO, Geneva, pp. 125-137, 156-157 and 284.
- WHO (1992) "Are the Hearts Beating? And with Rhythm?, Disturbing Questions Increasingly Relevant for Developing Countries", Health Action, (26), pp. 26-35.

Appendix

APPENDIX A

**INTERVIEW SCHEDULE TO ELICIT INFORMATION ON HEALTH AND NUTRITIONAL
STATUS OF WORKING WOMEN**

Date :

(Instruction : Please tick appropriate box(es) where applicable)

I. Identification

S.No.

Name of Respondent

Address

1. Occupational Category

Primary (A) - Construction/Stone Work

Secondary (B) - Textile Mill

Tertiary (C) - Clerical Staff

2. Socio-economic Details of Respondent and Family

2.1 Religion

- Hindu

- Muslim

- Christian

- Others

2.2 Family Type : (specify number of members)

- Nuclear

- Joint

4. Household Work Participation of Family

S.No.	Activities	Participation by					
		Respondent			Others		
		Complete	Partial	Nil	Complete	Partial	Nil
1.	Child rearing						
2.	Cooking						
3.	Household chores (cleaning, washing, etc.)						
4.	Shopping						
5.	Others (kitchen garden, home business etc.)						

5. Reasons for Seeking Employment

- a) For economic reasons, mainly :
income generation
- b) To augment family income :
- c) For better social status and recognition :
- d) Utilization of one's talents :
and capabilities for
personal, mental satisfaction
- e) Others (specify)

6. Disadvantages Faced by Women

- a) No control over income :
- b) Social/cultural prejudices :
- c) No scope for personal development :
- d) Insufficient time and energy for adequate child/personal care/and home management :
- e) Strenuous muscular effort :
- f) Job monotony/repetitive manual tasks :
- g) Sustained concentration/specific skill demands :
- h) Stress :
- i) Others (specify) :

7. Details Regarding Occupation

- 7.1 Nature of Job :
- a) Organised/Permanent :
- b) Unorganised/Temporary/
Seasonal :

7.2 Total time spent daily at work and at home

Time spent/day in hours	At job			At home		
	Active work	Over time	Rest period	Active work	Leisure/ residual time	Sleep
< 1						
1-3						
4-6						
7-9						
≥ 10						

7.3 Work Performance

	At beginning	At present	Reasons	Job experience in years
A. No. of stones cut/ bricks carried/ work period				
B. No. of yarn spools produced/shift/day				
C. Typing efficiency score (%)				

7.4 Absenteeism from work during the past year

No. of Days	Reasons

7.5 Work conditions and facilities provided at work spot

Occupation	Work conditions/facilities	Present	Absent
		(specify)	
Group A	a) Extreme heat and solar radiation b) Strenuous muscular effort (heavy load lifting) c) Unsafe noise levels (due to construction machinery) d) Inadequate water supply e) Provision and training about use of protective equipment f) Exposure to dusts (sand, cement, etc.) g) Security of alternative work (during off-season or during and after pregnancy)		

Occupation	Work conditions/facilities	Present	Absent (specify)
	<ul style="list-style-type: none"> h) Adequate health and medical facilities i) Guarantee of a living wage j) Others (specify-workers' union) 		
Group B	<ul style="list-style-type: none"> a) Exposure to dusts (cement, cotton fibre), chemicals (solvents, acids, alkalie dyes), gases etc. b) Safe handling procedures/provision of protective clothing (gloves, masks, aprons) c) Adequate ventilation and atmospheric pollution control (air ducts, filters, exhaust fans) d) Adequate temperature control (fans, AC, coolers) e) Adequate lighting f) Noise control (sound proofing, insulation, ear muffs) g) Comfortable work space and equipment h) Sanitary garbage and toxic waste disposal i) First aid centre/ESI/Mediclaim (with periodic health checkups) j) Medical leave with full pay k) Primary and maternity health centre/ creche for children l) Non-profit food store/canteen/ co-operative store, supplying nutritious subsidised food m) Adequate water supply n) Clean latrines and restrooms o) Periodic salary increments with perks (bonus) p) Transport facilities/allowances q) Others (specify-workers' union) 		
Group C	<ul style="list-style-type: none"> a) Adequate ventilation/lighting b) Temperature control c) Noise insulation d) Comfortable work space e) Medical leave with full pay f) Health care facilities (hospitals, creches) g) Canteen/mess/co-operative store h) Clean latrines & restrooms i) Periodic salary increments with other perks j) Others (specify-staff union) 		

8. Dietary Survey

8.1 Daily Meal Pattern

Day No.	Break fast	Midmorning	Lunch	Tea	Dinner
1.					
2.					
3.					

8.2 Food Consumption Practices

S.No.	Food Consumption Practices	Yes	No	Reasons
a)	1. Vegetarian 2. Non-vegetarian 3) Vegetarian consuming egg only			
b)	1. Canteen lunch 2. Tiffin lunch 3. Going home for lunch			
c)	In feeding most important is 1. Husband/head 2. Self (respondent) 3. Children/others			
d)	1. Practice of meal planning			

8.3 Foods given during special conditions/illness

S.No.	Special conditions/illness	Foods included	Reasons	Foods avoided	Reasons
1.	Infancy				
2.	Weaning/preschool age				
3.	Adolescence				
4.	Pregnancy				
5.	Lactation				
6.	Old age				
7.	Fever/cough/cold				
8.	Diarrhoea/dysentery				
9.	Others (specify)				

8.4 Family Food Consumption Details

Foods	Amount (in g)	Frequency of Consumption				Cost in Rs./Unit	Total cost/ month
		Daily	Frequently	Rarely	Never		

a) Cereals

Rice-raw/parboiled
Wheat
Ragi
Maize
Others (specify)

Total

b) Pulses

Bengal gram dhal
Black gram dhal
Green gram dhal
Redgram dhal
Others (specify)

Total

c) Green leafy vegetables

Agathi
Amaranth
Cabbage
Drumstick leaves
Others (specify)

Total

d) Other vegetables

Ashgourd
Beans
Brinjal
Drumstick
Lady's finger
Pumpkin
Others (specify)

Total

Foods	Amount (in g)	Frequency of Consumption				Cost in Rs./Unit	Total cost/ month
		Daily	Frequently	Rarely	Never		

e) Roots & Tubers

Beetroot
Carrot
Onion
Potato
Radish
Tapioca
Others (specify)

Total

f) Fruits

Apple
Banana
Guava
Lime
Orange
Papaya
Others (specify)

Total

g) Fleshy foods

Beef
Chicken
Mutton
Fish
Egg
Others (specify)

Total

h) Fats & Oils

Butter
Ghee
Vanaspathi
Refined oil
Others (specify)

Total

Foods	Amount (in g)	Frequency of Consumption				Cost in Rs./Unit	Total cost/ month
		Daily	Frequently	Rarely	Never		

i) Milk and Milk Products

Milk
 Butter milk/curd
 Cheese
 Others (specify)

Total

j) Sugar and Jaggery

Sugar
 Jaggery
 Others (specify)

Total

k) Prepared foods

Biscuits
 Pickles
 Pappads
 Sauces
 Sweets
 Others (specify)

Total

l) Beverages

Tea
 Coffee
 Others (specify)

Total

9. Personal Habits

S.No.	Habits	Frequency of Consumption				Amount consumed/day
		Daily	Frequently	Rarely	Never	
1.	Alcohol consumption (arrack, toddy, etc.)					
2.	Tobacco and betel chewing					

10. Comprehensive Clinical History and Assessment

10.1 Marital Status and Reproductive Performance

- Age of menarche :
- Age of first pregnancy :
- Age of menopause (if applicable) :
- No. of live births :
- No. of deaths < 1 year :

S.No.	Complications during pregnancy/lactation (Disorders of reproduction)	Yes	No
1.	Toxaemia of pregnancy		
2.	Post partum haemorrhage		
3.	Increased susceptibility to diseases/infections		
4.	Menstrual problems/dysmenorrhoea		
5.	Menopausal problems		
6.	Infertility		
7.	Oedema/gestational diabetes/hypertension		
8.	Stillbirth/abortion/miscarriage		
9.	Premature birth		
10.	Low Birth Weight of infant		
11.	Malformed/handicapped infant		
12.	Others (specify-poor milk secretion etc.)		

10.2 Incidence of diseases/accidents

Diseases/Accidents	Past problem	Existing complaint
a) Occupational Diseases		
i) Cancer and tumors (specify affected site/organ)		
ii) Lung diseases :		
1. Allergic symptoms (cough/sneezing/irritation)		
2. Occupational asthma		
3. Tuberculosis		
4. Byssinosis (due to cotton fibre)		
5. Asbestosis/silicosis		
6. Others (specify)		
iii) Neurological disorders		
1. Mental depression		
2. Convulsions and hyperactivity		
3. Polyneuritis/pricking/burning sensation		
4. Intermittent lethargy (locomotor ataxia)		
5. Carpal tunnel syndrome (sensory and motor dysfunction of hand; numbness, pain, tingling in thumb, index and ring fingers)		
6. Others (specify)		
iv. Kidney diseases (specify)		
v. Liver diseases :		
1. Jaundice/liver enlargement		
2. Others (specify)		
vi. Skin diseases :		
1. Primary irritant contact dermatitis		
2. Sunburn or 'hot spot' burn		
3. Allergic responses (scratching/swelling)		
4. Eczema/dyspigmentation		
5. Corrosion/clubbed fingers		
6. Others (fungal skin infection, dermatoses, etc.)		

Diseases/Accidents	Past problem	Existing complaint
--------------------	--------------	--------------------

vii. Eye Problems :

1. Poor vision
2. Eye strain and fatigue
3. Lacrymation (excessive/poor)
4. Occupational cataract/
corneal congestion
5. Others (specify)

viii. Ear problems :

1. Occupational deafness
2. Discharge from ears
3. Others (excessive wax, etc.)

ix. Musculo-skeletal disorders :

1. Body/spinal aches/specific
postural discomfort
2. Heat cramps
3. Postural deformities (hunch back, slouch)
4. Osteoporosis
5. Spondulitis/rheumatoid arthritis
6. Others (muscular dystrophy, etc)

x. Cardiovascular diseases :

1. Hypertension
2. Coronary artery diseases
3. Acute myocardial infarction
4. Varicose veins
5. Others

xi. Accidents :

1. Burns/scalds
2. Fractures/bone deformities
3. Bruises/lacerations
4. Haemorrhage
5. Others (specify)

Diseases/Accidents	Past problem	Existing complaint
--------------------	--------------	--------------------

b) Common Health Complaints

1. General weakness/listlessness
2. Headache/migraine
3. Excessive exhaustion/palpitations
4. Diabetes
5. Peptic ulcer
6. Hypotension
7. Diarrhoea/dysentery
8. Constipation/flatulence/piles
9. Viral/bacterial infections
10. Cough/cold/throat disorder
11. Others (specify)

10.3 Clinical assessment of nutritional deficiencies/excess

Organ	Signs related to nutritional excess/deficiency	Present
a. Hair	<ol style="list-style-type: none"> 1. Lack of lustre 2. Thinness 3. Brittle/easy pluckability 	
b. Skin & face	<ol style="list-style-type: none"> 1. Dry, wrinkled skin (xerosis) 2. Pellagrous dermatosis/ Butterfly pigmentation 3. Pallor face 	
c. Eyes	<ol style="list-style-type: none"> 1. Xerosis conjunctivae 2. Night blindness 	
d. Lips	<ol style="list-style-type: none"> 1. Angular stomatitis 2. Angular scars 3. Cheilosis 	
e. Tongue	<ol style="list-style-type: none"> 1. Pale & coated 2. Inflamed (glossitis) oedematous 3. Red, raw/ulcerated 	
f. Teeth	<ol style="list-style-type: none"> 1. Discoloured/chalky/mottled enamel 2. Dental caries 3. Enamel erosion & dental attrition 	
g. Gums	<ol style="list-style-type: none"> 1. Spongy, bleeding gums (gingivitis) 	

Organ	Signs related to nutritional excess/deficiency	Present
h. Glands	1. Thyroid enlargement	
i. Subcutaneous tissue	1. Oedema (of feet/body)	
j. Musculo-skeletal system	1. Muscular cramps & weakness 2. Local/diffuse skeletal deformities (bowlegs, knock knees etc.) 3. Osteoporosis	
k. Neurological changes	1. Abnormal sensations (paraesthesia) 2. Sensory loss/motor weakness	

10.4 Anthropometric measurements

	Before	After
Height (cm)		
Weight (kg)		
Mid-arm circumference (cm)		
Skin fold thickness (mm)		
	Blood Pressure	
	Pulse rate	
	Level of haemoglobin	

10.5 Regular Medications/Supplements consumed :

S.No.	Medication/Supplement	Frequency of Consumption				Amount consumed/day
		Daily	Frequently	Rarely	Never	
1.	Antibiotics					
2.	Multivitamins & minerals					
3.	Sedatives					
4.	Others (specify)					

10.6 Type of fuel used for cooking

- a) Wood
- b) Coal
- c) Kerosene
- d) Gas

10.7 Do you live near a :

1. Road with heavy traffic
2. Railway line
3. Factory etc.
4. None of the above

Signature

APPENDIX B

RATING SCALE TO ASSESS THE IMPACT OF JOB STRESS

S.No.	Criteria	Scores			
		Nil 0	Low 1	Moderate 2	High 3
1.	Work Environment				
2.	Work load/Time pressures & (unreasonable production targets)				
3.	Rate of pay (under paid job)				
4.	Clarity of job (Vague job description)				
5.	Control over work situation (lack of communication and consultation in the company)				
6.	Relationship with superiors and peers				
7.	Job recognition (feel undervalued)				
8.	Job security (lack of job security)				
9.	Discrimination based on race/religion/sex				
10.	Over - demanding job (demands of work on private life)				

RATING SCALE TO ASSESS THE EFFECT OF WORK STRESS ON FOOD INTAKE

S.No.	Criteria	Scores			
		Nil 0	Low 1	Moderate 2	High 3
1.	Irregular meals				
2.	Skipping of meals				
3.	No menu planning				
4.	High intake of rice-based diet				
5.	Low intake of leafy vegetables				
6.	Low intake of fruits and non-vegetarian foods				
7.	High intake of tea and coffee				
8.	Poor appetite				
9.	Use of tobacco, betel leaves, arecanuts and other stimulants				
10.	Ill-health and dietary restriction				

Note : Maximum score = 30 (ie., 3 x 10)

APPENDIX C

**CHECKLIST ADMINISTERED TO MANAGERS/HEALTH CARE PERSONNEL TO ELICIT
INFORMATION ON THE OHS (OCCUPATIONAL HEALTH SERVICES) ADHERED TO AT
THEIR WORK SPOTS**

Date :

I. Details Regarding the Selected Health Care Personnel

1. Name and address of Manager/
Health Care Personnel :
2. Designation and Qualification :
3. Years of experience :
 - a) Total work experience :
 - b) Experience in OHS/Personnel
Department :
4. Have you undergone any special training programme with respect to
OHS? Yes/No

If 'yes', specify the nature, duration and location of
participation of the training programme.

If 'No', specify the reasons :

- a) Not aware of the existence of OHS training programmes
- b) Not encouraged/permitted by management to participate
- c) Financial constraint
- d) Other reasons

**II. OHS (Occupational Health Services) Provided/and Adhered to at the
Work Sites**

1. Sector category
 - a) Primary (construction/stone quarry)
 - b) Secondary (Textile mill/ginning factory)
 - c) Tertiary (Clerical workers, typists/office personnel)

2. Is there a permanent and definite OHS in your workspot? Yes/No
If 'No', state the reasons :

- a) Financial constraints
- b) Policy of the management
- c) Individual's responsibility and not that of the management
- d) Others (specify)

If 'yes',

i) State the number of health personnel in employment

- a) Doctor/counsellor/social worker :
- b) Nurse/first - aid worker :
- c) Nutritionist/dietitian/food caterer. :
- d) Personnel officers and ESI medical officers :

ii) Do you have a separate well-equipped premises for rendering OHS?

- a) Yes (independent premises)
- b) No
- c) Yes, but in combination with the personnel department

3. Is there regularised medical examination of all the workers?

a) During the pre-employment stage Yes/No

If 'yes' state the parameters studied -
height and weight/general check up/blood
tests/specific cardio-pulmonary tests/others

b) Are periodic medical examinations conducted? Yes/No

If 'yes' specify -
Eye - camps/identification and
treatment of cardio - vascular
diseases/pulmonary-function
tests/stress-management counselling/
audiometry/work physiology/biological
monitoring/epidemiological studies etc.

4. Please provide details on the kind of -

- a) First-aid
- b) Medical treatment and engineering management and
- c) Follow-up medical care provided to the workers.

5. Is first-aid education, taught to the whole work force? Yes/No

If 'yes', indicate the aspects taught/demonstrated -

- i) Identification of occupational hazards Yes/No
- ii) Demonstration of life-saving first-aid techniques Yes/No
- ii) Periodic mock-exercises conducted to simulate emergencies Yes/No

6. Occupational hygiene

a) Is there periodic supervision of the work environment, with the co-operation of your peers (engineers, deputy managers, supervisors, contractors, etc.)? Yes/No

b) If 'yes' indicate the activities performed :

- i) Hazard identification Yes/No
- ii) Monitoring and evaluation of machinery Yes/No
- iii) Control measures of pollutants (within the prescribed TLV - Threshold Limit Values) Yes/No
- iv) Development of personal protective devices Yes/No

State briefly the hazard identification methods/devices and measures used -

Pollutant/occupational hazard Hazard identification Control measures

- i) Dusts
 - ii) Noise
 - iii) Vibration
 - iv) Heat
 - v) Radiation
(ionising/non-ionising)
 - vi) Lighting
 - vii) Ventilation
 - viii) Chemical pollutants
 - ix) Others (if any)
-

c) What are the approaches of your OHS from the time of recruitment to retirement of workers?

- i) Preventive service Yes/No
- ii) Promotive service Yes/No
- iii) Curative service Yes/No
- iv) Rehabilitative service Yes/No

d) Is there favourable co-operation and exchange of ideas and services between the different departments and management? Yes/No

e) Ergonomics : Are the principles of ergonomics followed, with respect to floor plan, placement design, etc., in order to reduce fatigue of workers? Yes/No

f) Crowding and area of ventilation per unit area in different work sites

i) Total number of workers

No.of male workers :

No.of female workers :

ii) Floor area (sq.m.) :

iii) No.of doors :

iv) No.of windows/
ventilation ducts :

v) No.of exhaust fans :

7. Health Counselling and Health Education :

a) Is there a need for health counselling and to teach occupational and general health education? Yes/No
(State reasons)

b) Are health counselling and health education conducted periodically at your work spot? Yes/No

If 'yes', provide details on such programmes/efforts.

8. Provision of medical care : State the pertinent aspects of medical care provided in your institution.

For eg.,

a) ESI Yes/No

b) Consultation with private doctor: Yes/No

c) Referral services : Yes/No

d) Medical leave : Yes/No

e) Provision of civic amenities (toilets, bathrooms, drinking water) Yes/No

f) Provision of family welfare programmes (e.g., creche, restrooms) Yes/No

g) Pre-retirement maintenance : Yes/No

9. Nutrition and Food Service Management

a) Is there a canteen supplying low-cost, clean and nutritious food within the premises? Yes/No

Furnish details regarding number of personnel, type of food served, cost etc.

b) How many workers actually use the canteen? (Give reasons for drawbacks/popularity)

c) Do you use audio-visual aids (e.g.) charts, posters etc., to teach nutrition education? Yes/No

Signature

APPENDIX D
INDIVIDUAL FOOD INTAKES OF THE SUBSAMPLE OF WORKING WOMEN
(in g.) (n= 20/group)

Group	S.No.	Cereals	Pulses	Green Leafy Veggies.	Other Veggies.	Roots & Tubers	Fleshy Foods	Fruits	Milk	Fats & Oils	Sugar
A	1	520	30	15	30	50	10	12	45	16	36
	2	485	33	16	36	48	15	13	50	19	28
	3	530	30	8	24	45	8	22	60	20	40
	4	515	40	12	28	36	11	15	48	21	45
	5	492	44	11	22	58	20	8	57	18	38
	6	543	37	13	31	62	14	15	70	20	40
	7	520	31	20	30	53	7	16	53	15	41
	8	505	40	21	35	60	15	30	44	17	44
	9	520	48	14	40	50	24	11	60	20	43
	10	525	39	16	25	55	12	10	50	18	36
	11	530	33	17	33	51	13	14	56	17	27
	12	506	36	9	37	48	10	17	80	20	40
	13	490	40	10	31	47	16	9	45	20	47
	14	560	39	16	36	50	13	5	60	22	37
	15	528	28	15	38	55	9	16	58	15	38
	16	476	27	15	29	58	10	11	55	16	46
	17	530	36	21	35	45	10	18	45	20	42
	18	485	39	16	32	53	12	20	60	16	37
	19	545	36	13	33	63	6	14	70	17	39
	20	555	40	10	35	54	17	15	58	14	42
B	1	427	53	18	62	60	15	20	125	26	33
	2	440	62	15	55	75	22	25	160	30	30
	3	428	54	27	65	70	26	15	150	28	35
	4	390	65	25	64	58	30	28	140	25	28
	5	427	66	23	55	66	22	30	130	32	36
	6	436	65	20	50	80	20	32	124	30	32
	7	422	59	22	58	72	18	40	200	26	40
	8	430	67	26	63	73	30	42	120	27	30
	9	387	64	25	66	69	14	30	155	35	35
	10	405	53	20	62	75	17	36	150	34	25
	11	445	64	24	45	71	20	38	100	32	30
	12	425	71	22	56	65	26	25	130	24	28
	13	418	58	27	66	75	12	26	125	25	27
	14	442	58	19	68	74	15	35	150	28	33
	15	420	78	21	70	82	40	40	130	29	35
	16	433	64	24	65	58	23	44	160	29	36
	17	415	80	23	63	75	27	35	115	30	22
	18	427	73	24	64	70	33	20	220	30	28
	19	392	70	30	48	65	20	40	120	26	33
	20	429	73	28	52	76	27	32	100	30	34
C	1	407	40	22	48	52	12	15	87	24	32
	2	414	55	21	52	62	18	28	114	21	29
	3	362	63	23	50	50	21	36	113	27	21
	4	394	57	20	47	51	22	22	90	20	30
	5	388	50	16	45	47	15	22	120	23	28
	6	377	46	18	55	65	10	18	100	24	30
	7	390	61	20	56	60	26	28	120	24	35
	8	402	42	24	60	60	14	35	126	19	27
	9	400	45	21	50	55	17	26	75	25	35
	10	368	48	19	52	50	16	24	85	20	34
	11	387	56	22	58	53	20	18	110	18	23
	12	376	45	22	60	45	15	30	115	24	27
	13	392	59	25	57	54	22	27	210	26	30
	14	390	47	23	49	56	19	28	118	30	36
	15	410	53	20	54	46	16	33	107	27	35
	16	412	52	20	65	60	17	26	122	20	28
	17	385	48	22	48	52	15	24	140	21	29
	18	375	56	24	56	51	18	18	95	22	30
	19	400	62	19	52	52	20	23	106	23	33
	20	378	53	23	50	60	14	25	110	25	29

APPENDIX E

INDIVIDUAL NUTRIENT INTAKES OF THE SUBSAMPLE OF WORKING WOMEN
(n= 20/group)

Group	S.No.	Energy (Kcal)	Protein (g)	Fibre (g)	Fat (g)	Calcium (mg)	Iron (mg)	Beta-Carotene (mcg)	Thiamine (mg)	Riboflavin (mg)	Niacin (mg)	Vit.C (mg)
A	1	3214	28.30	4.96	18.30	412	22.30	2037	1.22	1.26	14.20	28.10
A	2	2464	26.50	4.22	21.20	316	15.30	1654	0.67	0.75	11.80	17.70
A	3	2564	32.40	4.31	21.70	322	14.70	1732	0.69	0.72	12.70	14.60
A	4	2819	37.80	4.75	22.50	345	14.60	1986	0.73	1.13	13.60	21.20
A	5	2216	35.80	4.19	19.30	333	11.70	1437	0.59	0.64	11.10	18.70
A	6	2688	38.70	4.36	21.60	361	12.70	1666	0.73	1.11	13.70	15.20
A	7	2415	39.40	4.37	16.70	325	15.00	1760	0.58	1.03	11.50	18.70
A	8	2513	38.70	4.27	18.00	327	14.60	1602	0.80	0.98	13.60	19.50
A	9	2554	38.70	4.50	21.50	319	16.70	1582	0.79	0.97	11.70	15.62
A	10	3019	37.30	4.86	19.30	406	18.90	2167	1.20	1.33	15.20	21.30
A	11	3021	39.70	5.11	18.70	376	20.50	2088	0.97	1.41	14.80	22.20
A	12	2761	38.30	4.74	21.50	361	18.30	1873	0.67	1.20	13.70	23.00
A	13	2422	36.70	4.30	22.00	298	19.10	1680	0.88	0.70	14.00	18.70
A	14	3207	35.70	4.76	23.10	340	22.00	2123	1.36	1.25	14.90	17.50
A	15	2605	29.70	3.96	16.70	299	17.20	1705	0.99	0.76	13.60	19.20
A	16	2218	38.70	3.87	17.30	276	15.40	1231	0.61	0.60	11.80	16.80
A	17	2564	38.40	3.96	21.10	290	18.10	1700	0.75	0.83	15.00	21.80
A	18	2528	45.90	4.78	17.20	288	17.70	1902	1.05	0.62	12.50	28.60
A	19	2837	44.20	4.22	18.00	316	22.30	2137	0.88	0.90	14.30	31.30
A	20	3008	38.20	4.67	16.00	321	20.70	2205	1.28	1.04	15.10	30.00
B	1	2863	55.40	5.61	36.20	476	23.00	2581	1.56	1.23	16.20	41.20
B	2	2744	56.30	4.98	40.20	458	22.70	2374	1.54	1.19	14.70	26.70
B	3	2734	54.90	6.33	37.40	504	21.60	2486	1.62	1.21	15.30	28.90
B	4	1982	50.60	5.87	34.80	425	18.40	2136	1.36	0.93	12.30	24.60
B	5	2231	52.20	7.31	44.00	419	19.50	2214	1.45	1.14	11.70	23.70
B	6	2507	57.70	6.07	40.10	468	20.60	2364	1.08	1.16	13.40	32.30
B	7	2432	53.30	5.88	36.30	465	24.60	2581	1.46	1.13	14.60	28.70
B	8	2467	52.00	6.24	36.70	502	23.50	2344	1.50	1.06	15.20	40.00
B	9	1997	47.70	5.05	44.80	438	18.80	2016	1.16	0.93	11.60	30.20
B	10	2147	48.70	9.36	40.20	441	20.10	2088	0.98	0.94	12.80	36.70
B	11	2715	55.90	8.74	38.60	604	26.70	2617	1.72	1.40	15.40	45.40
B	12	2423	54.50	6.22	34.70	485	24.20	2336	1.43	1.22	12.50	28.90
B	13	2078	50.60	7.67	35.10	421	21.70	1988	1.37	0.95	11.30	33.90
B	14	2621	55.70	6.41	37.50	496	25.50	2405	1.94	0.98	15.20	44.50
B	15	2380	50.50	5.90	39.20	511	21.30	1976	1.14	0.87	11.70	46.70
B	16	2445	58.10	6.12	37.50	473	23.30	2243	1.33	0.88	12.40	41.70
B	17	2118	51.30	5.87	40.20	432	19.60	2110	1.70	1.84	10.90	38.70
B	18	2605	45.70	6.31	38.90	488	24.40	2414	2.01	1.24	13.60	39.80
B	19	2907	42.80	6.24	35.40	446	20.50	1985	1.66	0.95	11.70	34.00
B	20	2723	59.40	4.21	30.70	508	21.60	2506	1.29	1.29	15.80	44.10
C	1	1897	38.20	3.86	19.39	378	11.60	1849	1.11	0.51	16.30	23.60
C	2	2066	43.90	4.27	31.64	418	18.30	1977	1.33	0.80	14.90	37.00
C	3	1991	44.30	5.03	34.62	491	21.20	2263	1.43	0.91	14.40	38.60
C	4	1976	40.70	4.16	31.65	388	18.70	2058	1.37	0.87	12.10	25.40
C	5	1784	36.50	3.75	20.78	324	16.50	1786	1.21	0.66	11.50	27.70
C	6	1850	39.30	3.83	29.33	396	19.50	1965	1.30	0.81	13.40	26.60
C	7	1822	36.90	3.94	31.60	352	19.30	2041	1.14	0.76	10.70	27.30
C	8	1895	38.60	4.61	30.07	368	19.70	2121	1.30	0.84	13.40	24.50
C	9	1987	39.40	4.88	31.04	413	22.30	2166	1.29	0.96	13.60	27.20
C	10	1791	39.70	4.55	29.45	370	16.80	1867	1.17	0.74	12.50	24.40
C	11	1837	38.40	4.32	28.33	386	19.50	1965	1.19	0.86	13.80	25.50
C	12	1788	41.60	4.77	27.63	359	22.30	1866	1.18	0.94	13.40	27.00
C	13	1839	42.20	4.76	29.11	400	27.60	1934	1.20	0.91	15.00	29.60
C	14	1846	42.70	5.10	27.44	404	20.40	2038	1.21	0.95	9.70	28.90
C	15	2045	44.80	5.80	32.26	486	22.50	2158	1.26	1.10	12.60	36.30
C	16	2225	44.80	5.31	34.69	458	24.60	2307	1.37	1.21	12.90	25.70
C	17	1795	36.90	3.86	27.37	380	18.30	2002	1.18	0.78	10.90	28.90
C	18	1920	40.50	4.13	29.76	371	22.10	2247	1.24	0.99	11.40	27.60
C	19	1886	39.70	4.11	20.44	361	17.80	2216	1.22	1.10	10.00	27.80
C	20	2112	43.80	4.96	33.16	492	22.40	2687	0.90	1.33	12.00	34.80

APPENDIX F

BIOCHEMICAL PARAMETERS OF THE SUB SAMPLE OF THE WORKING WOMEN

(n=20/group)

Subject No.	Serum cholesterol (mg %)			Serum total protein (g %)			Random blood sugar (mg %)			Eosinophil count (%)		
	A	B	C	A	B	C	A	B	C	A	B	C
1.	200	212	175	6.5	7.2	5.8	130	184	98	11.5	12.7	6.0
2.	142	210	221	6.0	6.7	6.2	122	130	115	14.3	8.9	3.3
3.	157	196	216	5.5	6.7	6.0	97	126	126	22.4	11.6	2.7
4.	166	205	184	5.1	6.9	5.7	84	145	90	25.2	15.2	7.3
5.	175	194	209	5.7	6.6	6.5	110	131	125	14.0	14.0	2.8
6.	165	226	155	5.7	6.3	5.8	125	114	94	15.5	23.7	6.5
7.	122	220	138	5.2	6.8	5.4	83	166	74	17.7	14.2	6.6
8.	140	200	172	5.0	6.0	5.6	80	127	96	13.8	22.3	5.5
9.	134	230	206	5.6	7.3	5.9	106	212	100	9.9	16.9	5.7
10.	205	204	205	5.8	7.1	6.0	125	133	112	14.6	18.0	5.5
11.	170	195	170	5.1	5.8	6.1	76	105	111	19.0	18.2	5.1
12.	155	234	163	6.6	6.4	6.1	132	142	153	12.6	15.5	3.0
13.	169	172	245	5.4	6.5	6.6	85	120	140	15.4	15.9	3.3
14.	157	187	202	5.5	6.6	6.4	93	151	137	16.7	14.7	4.6
15.	135	202	230	5.8	6.5	6.3	94	124	121	17.0	13.8	2.2
16.	168	222	200	6.2	7.0	6.2	126	138	105	12.4	15.9	5.5
17.	140	187	248	5.9	5.9	6.0	100	109	135	15.3	27.7	2.7
18.	158	225	210	5.3	6.2	6.4	75	115	108	16.7	24.2	2.7
19.	146	150	174	5.2	6.0	5.7	88	104	95	13.7	28.7	8.1
20.	162	187	137	5.4	6.2	6.5	90	117	122	18.3	26.5	3.8
Mean	158.30	202.90	193.00	5.63	6.54	6.06	101.05	134.65	112.85	15.80	17.93	4.65
SD	+20.79	+20.81	+34.90	+0.45	+0.44	+0.33	+19.41	+27.09	+19.69	+3.60	+5.64	+1.77
Normal Range	150 - 250			6.0 - 8.0			80 - 140			1.0 - 6.0		

APPENDIX G

TOTAL CRITERIA SCORES OF RATING TESTS

a. Total Criteria Scores of Rating Test Indicating the Impact of Job Stress

(n=20/group)

S.No.	Criteria	Group A	Group B	Group C
1.	Work Environment	52	57	26
2.	Work load	53	52	35
3.	Rate of pay	53	32	31
4.	Clarity of job	42	17	8
5.	Control over work situation	44	29	14
6.	Relationship with superiors and peers	21	22	16
7.	Job recognition	37	33	20
8.	Job security	42	8	12
9.	Discrimination based on race/religion/sex	32	25	13
10.	Over - demanding job	24	21	9

b. Total Criteria Scores of Rating Test Performed to Assess the Effect of Work Stress on Food Intake

(n=20/group)

S.No.	Criteria	Group A	Group B	Group C
1.	Irregular meals	53	45	7
2.	Skipping of meals	42	33	11
3.	No menu planning	54	31	18
4.	High intake of rice-based diet	42	15	7
5.	Low intake of leafy vegetables	44	47	21
6.	Low intake of fruits and non-vegetarian foods	37	34	9
7.	High intake of tea and coffee	56	46	42
8.	Poor appetite	41	18	6
9.	Use of tobacco, betel leaves, arecanuts and other stimulants	50	26	4
10.	Ill-health and dietary restriction	37	14	31

APPENDIX H

LINEAR MULTIPLE REGRESSION FORMULAE USED FOR CALCULATING HEALTH INDEX

I. Group A

$$\begin{aligned} \text{Occupational} &= 4.421 + 0.036 x_1 + 0.035 x_2 + 0.026 x_3 - 0.051 x_4 \\ \text{diseases} &\quad - 0.294 x_5 - 0.014 x_6 + 0.567 x_7 + 0.037 x_8 \end{aligned}$$

$$\begin{aligned} \text{Non-} & \\ \text{occupational} &= 5.176 + 0.279 x_1 - 0.007 x_2 - 0.001 x_3 + 0.088 x_4 \\ \text{diseases} &\quad - 0.993 x_5 - 0.126 x_6 + 0.028 x_7 + 0.128 x_8 \end{aligned}$$

$$\begin{aligned} \text{Nutritional} &= 6.587 + 0.279 x_1 - 0.007 x_2 - 0.001 x_3 + 0.088 x_4 \\ \text{deficiencies/} &\quad - 0.993 x_5 - 0.126 x_6 + 0.028 x_7 + 0.128 x_8 \\ \text{excess} & \end{aligned}$$

Number of observations = 200/group

Degrees of freedom = 190

2. Group B

$$\begin{aligned} \text{Occupational} &= 10.865 - 0.034 x_1 + 0.206 x_2 - 0.018 x_3 - 0.019 x_4 \\ \text{diseases} &\quad - 0.530 x_5 - 0.005 x_6 + 0.086 x_7 + 0.059 x_8 \end{aligned}$$

$$\begin{aligned} \text{Non-} & \\ \text{occupational} &= - 2.031 - 0.001 x_1 + 0.130 x_2 + 0.016 x_3 + 0.071 \\ \text{diseases} &\quad x_4 - 0.421 x_5 - 0.018 x_6 + 0.133 x_7 + 0.025 x_8 \end{aligned}$$

$$\begin{aligned} \text{Nutritional} &= 13.765 - 0.011 x_1 + 0.200 x_2 + 0.018 x_3 + 0.002 x_4 \\ \text{deficiencies/} &\quad - 1.172 x_5 - 0.061 x_6 - 0.069 x_7 + 0.053 x_8 \\ \text{excess} & \end{aligned}$$

3. Group C

$$\begin{aligned} \text{Occupational} &= 4.91 + 0.002 x_1 + 0.020 x_2 + 0.010 x_3 - 0.028 x_4 - \\ \text{diseases} &\quad 0.180 x_5 + 0.022 x_6 - 0.154 x_7 - 0.034 x_8 \end{aligned}$$

$$\begin{aligned} \text{Non-} & \\ \text{occupational} &= 0.244 - 0.002 x_1 + 0.216 x_2 + 0.003 x_3 + 0.021 x_4 \\ \text{diseases} &\quad - 0.134 x_5 + 0.006 x_6 + 0.013 x_7 + 0.026 x_8 \end{aligned}$$

$$\begin{aligned} \text{Nutritional} &= 11.634 + 0.005 x_1 + 0.009 x_2 - 0.014 x_4 - 0.625 x_5 \\ \text{deficiencies/} &\quad - 0.031 x_6 - 0.177 x_7 - 0.032 x_8 \\ \text{excess} & \end{aligned}$$

Key : Variables :

X_1 = Age; X_2 = Number of pregnancies; X_3 = Systolic blood pressure;
 X_4 = Diastolic blood pressure; X_5 = Level of haemoglobin; X_6 = BMI;
 X_7 = Educational status; X_8 = Age at menarche

Note: Family income did not have any effect.