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RESEARCH ARTICLE

SOCIO ECONOMIC AND NUTRITIONAL STATUS OF HANDLOOM WEAVERS FROM THIRUVANNAMALAI DISTRICT, TAMIL NADU

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ABSTRACT

Handloom Industry is the second largest industry next to agriculture providing livelihood to millions of weavers in India. Handloom sector plays a very important role in the country's economy. Handloom weaving in India is an inherited art where weavers learn to weave from their ancestors and thus this craft is practised widely in rural areas and is providing employment to a wide section of rural artisans. Despite the fact that Indian handloom industry has made a distinct place in the world, this sector has not attained proper importance as far as weaving related health problems and their effects are concerned. Several health hazards are associated with weaving and related activities which may cause stress and strain to weavers and pose several health related risk factors to them. Majority of the weavers are facing severe occupational health problems such as Asthma, Tuberculosis, Inflammation of respiratory system, Blood pressure, Obesity, Cardiovascular diseases and Diabetes mellitus. The present research was planned to study the socio economic back ground, dietary pattern, life style and work pattern of the handloom weavers of Thiruvannamalai district, who form a sizable segment of the weaving community in the state. The study also aimed at assessing the nutritional status of the handloom weavers, identify the occupational health problems and to plan and implement functional food based approaches and nutrition education to overcome the health related problems.

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INTRODUCTION

In India, handloom Industry is the second largest industry next to agriculture providing livelihood to millions of weavers. Handloom sector plays a very important role in the country's economy by providing direct employment to over 65 lakhs of people in weaving activities in India (NFHS, 2008). In Tamil Nadu more than 2.17 lakh people are involved in weaving profession and a considerable number of people are engaged in weaving in Thiruvannamalai district of Tamil Nadu (NADP, 2008).

Thiruvannamalai district is having handloom weaving tradition by Sengunthar Mudaliars more than 500 years back and the nearest handloom weaving location is available 10 Kms. away from Thiruvannamalai. Some of the Taluk head quarters in Thiruvannamalai District like Vandavasi and Cheyyar are having handloom weaving villages over many centuries. Kilkodungalur, Vazoor, Ponnur, Kannagampoondipur, Cittaragavurpudur, Vedal, Ammayappattu, Koviloor, Cheyyar, Vadamanapakkam and Hasanamapettai are the villages having handloom weaving industries. The annual production of various handloom products through these handloom units

amounts to 500 crores. Out of which 35 – 40 per cent production is being procured by Co-optex and the balance 60 per cent goods is being sold by the societies through open market and its outlet called Loom World (www.msmediagra.gov.in/clusterdetails.pdf). Usually weaving communities have crowded, poorly ventilated and poorly lighted rooms. Workers have to work under unhygienic conditions leading to health problems. Moreover the working time in such poorly managed environment is 12 hours and work in shifts i.e., morning and evening. Sometimes, it takes 14-16 hours and they continuously have to sit on weaving machine without any rest.

According to Occupational Health Study in Carpet weaving industry in Iran, the main health and safety hazard faced by weavers, included musculoskeletal problems due to odd squatting position and vision disorders due to continuous attention required during work, and health hazards due to inhalation of wool (www.fibre2fashion.com/industry.../major-health-risk-factors-in-iranian-h). Weavers in the cotton processing industries have the risk of developing obstructive respiratory conditions due to prolonged exposure to cotton dust (Mberikunashe *et al.*, 2006). National Family Health Survey (NFHS, 2005) data on nutritional status of adult men and women revealed that the prevalence of under nutrition in adults is higher in rural areas and over nutrition is higher among

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adults of urban areas. Good Nutrition is vital to promote not only regeneration and repair but also needed for optimal metabolic functioning and to prevent chronic degenerative diseases.

Sheldon Cohen, (2010) stated that socio economic status during adulthood is associated with a wide range of adult health outcomes and socio economic conditions. Socio economic status is a powerful predictor of adult physical health. It is associated with increased risk of mortality from cardiovascular disease (coronary heart disease, stroke) respiratory disease, diabetes, hypertension and musculoskeletal disorders. In the current scenario, the handloom weavers are the poorest of the lot, least respected, socially and economically deprived, living in debts and almost living like an island in the Indian society. Besides in large parts of India, handloom weaving lost its fame and prosperity. Adult handloom weavers are one of its biggest assets. They are the pillars and foundations of weaving community. It is splendid to utter that an ancient tradition affords large employment opportunities. Weavers in the handloom sector are mostly illiterate and semi-literate due to low economic conditions. This in turn may bring out livelihood insecurity and social insecurity (Premsundar and Kannan, 2013).

There are no studies on the socio economic and nutritional status of the handloom weavers in Thiruvannamalai district and hence this study on "Socio Economic and Nutritional Status of Handloom Weavers from Thiruvannamalai District, Tamil Nadu" was undertaken with the following objectives to

- Study the socioeconomic background, dietary pattern, life style and work pattern of the handloom weavers of Thiruvannamalai District
- Assess the nutritional status of the handloom weavers and
- Study the occupational health problems of handloom weavers

METHODOLOGY

a) Selection of area and subjects

The present study was carried out in Thiruvannamalai district of Tamil Nadu within 15 kilometers radius. Based on the maximum availability of handloom weavers the investigator selected four places (2 rural and 2 urban) – S.V.Nagaram, Kilpattu, Kalambur and Nadukuppam for the study. Handloom weavers numbering 513 in the age group of 20-60 years who were willing to co-operate for the study were selected from these four places by convenient sampling method.

b) Conduct of socio economic and dietary survey and collection of other details

A schedule is a form containing some questions or blank tables to be filled by the research investigator after getting information from the informants. A schedule may contain direct questions and presented by the interviewer (Saravanavel, 2007). An interview schedule is a method of collecting data and involves presentation of oral-verbal stimuli and reply in terms of verbal-oral responses. Accordingly an interview

schedule was developed to collect information on the socioeconomic background relating to age, education, number of family members, type of family, occupation and income of the family and dietary information relating to dietary pattern, type of beverages, type of diet, type of oil, food intake pattern, frequency of consumption of fruits, vegetables, calcium, Vitamin-A and Vitamin D rich foods. Questions on occupational health were also included. The interview schedule was pretested on a subsample of 10 weavers and necessary modifications were incorporated. An interview method is said to be the easiest and the most reliable method of collecting data (Kothari, 2000). Hence the investigator selected interview method and collected the necessary details from the handloom weavers by administering the specially developed and pretested interview schedule, during the timings mentioned to be convenient by the handloom weavers at their residence or cooperative societies.

c) Assessment of nutritional status

Nutritional status can be determined with the help of anthropometric, clinical, biochemical assessment and dietary intake. Combination of these methods provide better picture of assessment of nutritional status of the target groups. Measurements of nutritional status are usually valuable as they may be predictive of health outcomes. The practical requirements for assessment of nutritional adequacy arise from the need to intervene either by advice or by more aggressive strategies to improve the nutrition of individuals or population and thereby to reduce the risks and the burden of the disease that may have a nutritional component (Geisseler and Power, 2008). Anthropometric and clinical examination was done for all the handloom weavers, and food intake by 24 hour food recall method for three days was done for 60 (12 % of the sample) handloom weavers surveyed.

i) Anthropometric Measurements

Anthropometry is the measurement of human body parts and sites to assess the nutritional status (Rao, 2000). Nutritional anthropometry is a measurement of human body at different ages and levels of nutritional intake. It is based on the concept that appropriate measurements should reflect any morphological variation occurring due to significant functional physiological changes (Bamji *et al.*, 2009).

Height

The height of an individual is influenced by genetic and environmental factors. Inadequate dietary intake and or infection reduce nutrient availability at cellular level resulting in growth retardation. Height is affected by long-term nutritional deprivation, and is considered as an index of chronic or long duration malnutrition (NIN, 2009). Height was measured using a vertical measuring rod (anthropometer). The selected adults were made to stand erect on a levelled surface, without shoes, looking straight with heels together and toes apart. The investigator hold firmly the chin of the subjects with left hand and the occiput of the subject with the right little finger to maintain the Frankfurt horizontal plane. The readings were taken when anthropometer rod was still in position. An

average of three successive measurements was taken as the final measurement and recorded to the nearest 0.1cm.

Weight

Body weight is the most widely used simplest method to assess the growth and development of an individual (NIN, 2009). Weight also provides a crude evaluation of overall fat and muscle stores (Brahman, 2005). Body weight is the simplest reproducible anthropometric measurements for the overall evaluation of nutritional status of subjects. Human weighing balance was used to measure the body weight of the adults. Zero error of the scale was checked before weighing and measurements were done under basal conditions. The adults were made to stand on the platform of the balance without shoes and with normal clothing and weights were recorded to the nearest 0.1Kg.

Body Mass Index (BMI)

WHO Expert Committee (2000) recommended the use of BMI for the determination of the nutritional status of the population between the age group of 20-60 years. BMI or Quetelet's Index is the ratio of the weight in kg to height in meter square. It is used as a measure of fatness in adults (Garrow *et al.*, 2002). BMI is a simple index of weight-for-height that is commonly used to classify underweight, overweight and obesity in adults (WHO, 2011).

$$\text{BMI} = \text{Weight in kg} / \text{Height in m}^2$$

BMI is a validated measurement of nutritional status. Body Mass Index is the simple and widely used method for estimating body fat mass and an accurate reflection of body fat percentage in the majority of the selected population (Umaito, 2006). BMI values were determined using height and weight measurements of the selected adult handloom weavers and accordingly they were categorized.

ii) Bio chemical Assessment

Bio chemical tests are the most objective and sensitive measures of nutritional status (Krause, 2008). Bio chemical estimation provides an accurate indication of the nature of the short term nutritional problems (McGraw Hill, 2002). Most bio-chemical tests reveal current status and useful to quantify any mild deficiencies (Park, 2000). Bio chemical tests can be conducted on easily accessible body fluids like blood and urine and help to diagnose disease prior to clinical stage. Biochemical measures of nutritional status yield objective and quantitative measure and are the most sensitive indicators of nutritional status (www.nhibi.nin.gov).

Hemoglobin

Hemoglobin (Hb) is the protein in red blood cells that carries oxygen. A low hemoglobin count is generally defined as less than 13.5g of hemoglobin per deciliter of blood for men and less than 12 grams per deciliter for women and referred to as anemia, which is associated with many diseases (www.mayoclinic.com/health/low-hemoglobin/myo/83).

Hemoglobin levels were estimated for all the adults by using cyanmethemoglobin method.

iii) Clinical Examination

Clinical examination is an effective tool to assess the nutritional deficiencies of the population. All the 513 adult handloom weavers were examined for clinical signs and symptoms with the help of a physician and noted in the clinical examination schedule designed by Shills (2002) and Sri lakshmi (2006).

iv) Food intake

The purpose of any dietary survey is to find out the habitual food and nutrient intake of individuals. Diet surveys provide information about dietary intakes, pattern of specific foods consumed and nutrient intakes. It indicates relative dietary inadequacies, which are helpful in planning for nutrition education activities (Srilakshmi, 2006). The purpose of computing the three days recall method is to determine the balance of calorie input and output (<http://betterhealthchannel.vic.gov>). To assess the food consumption pattern of the selected subsample of 60 handloom weavers a 24 hour recall method was followed for three consecutive days. Standard cups and measures were shown and the adults were asked to recall their exact food intake during the previous three days. Quantities of foods consumed were estimated in standard measurements and entered on the data sheet to determine the dietary intake of various foods. Nutrient intake of the adults was computed using the Food Composition Tables (Gopalan *et al.*, 2007) and compared with the Recommended Dietary Allowances (ICMR, 2009).

Ethical Clearance

The research design of the study was presented before the Avinashilingam University Ethical Committee and got clearance with the number HEC.2011.33.

RESULTS AND DISCUSSION

Socio-economic background of the Handloom weavers

Table I depicts the Socio economic background of the selected handloom weavers.

Age

Age is an achieved characteristic in the life cycle of a human being, Rao, (1997). The age composition of the handloom workers showed that a majority of 56 per cent of the males belonged to the age group of 40-50 years, whereas 51 per cent of the female adults were in the age group of 20-30 years. Comparatively lesser number of both male (13 %) and female (28 %) adults were within 30-40 years of age. Weavers above 50 years constituted only 16 per cent of male and 5 per cent of females. Among the 513 adults surveyed a majority of 53 per cent belonged to the age group of 40-50 years.

Table 1. Socioeconomic background of the handloom weavers

Details	Male (474)		Female (39)		Total (513)	
	No.	%	No.	%	No.	%
Age (Years)						
20-30	70	15	20	51	90	18
30-40	60	13	11	28	71	14
40-50	268	56	6	16	274	53
>50	76	16	2	5	78	15
Total	474	100	39	100	513	100
	474	100	39	100	513	100
Gender Education						
Primary school	253	53	7	18	260	50
Middle school	126	27	1	2	127	25
SSLC	77	16	4	10	81	16
Higher Secondary	9	2	2	5	11	2
Diploma	3	1	1	3	4	1
Degree	0	0	0	0	0	0
Illiterate	6	1	24	62	30	6
Total	474	100	39	100	513	100
	474	100	39	100	513	100
Family type						
Joint	30	6	1	3	31	6
Nuclear	444	94	38	97	482	94
Total	474	100	39	100	513	100
	474	100	39	100	513	100
Family Size						
Small (2-4)	445	94	24	62	469	91
Medium (5-7)	11	2	13	33	24	5
Large (>7)	18	4	2	5	20	4
Total	474	100	39	100	513	100
	474	100	39	100	513	100

Gender

Weaving is one of the activities which have the scope for women participation. The distribution of handloom weavers by gender is dominated by females at the national level. As per the Third National Handloom Census (2011) 77.9 per cent of the workers are women. Distribution pattern of population between males and females affects their relative and economic relations (Rao, 1997). Results of the present study revealed that a majority (92%) of handloom weavers were males and only 8 per cent were females which is different from the Third National Handloom Census data.

Education

Literacy is one of the important social variables that influence both social and economic development of a country (A P J. Abdul Kalam, 2005). Education certainly is a means to all-round progress of individuals. In other words, the pathway to human development goes through the lanes of education. Educational level is a better indicator of social development and will influence the economic development in many ways. Therefore, there is every need to improve the educational status of the population for better social and economic development. The findings of the present study indicated that a majority of 53 and 18 per cent of male and female adults respectively had completed primary education. Whereas only 1 per cent of the male and a higher percentage (62%) of female adults were

found to be uneducated. A lesser percentage (27 %) of male and (2 %) female had completed up to middle school. Only 16 per cent male and female had studied upto SSLC. A very low percentage (2 %) had got higher secondary education. None of them had received any degree or professional education.

Family Type

Indian families are broadly grouped into nuclear, joint and extended joint families. By tradition, joint family and extended joint families were more popular in the society. But nowadays nuclear family system is widely present in the society and are mainly found in urban areas. Slowly, this trend is also spreading to rural areas. The results of the study indicated that 94 and 97 per cent of the male and female adult weavers belonged to nuclear type of families and the remaining 6 and 3 per cent of them belonged to joint family type. The findings are in accordance with the report of the year book of India (2000) where 82 per cent of the families in India are reported to be of nuclear type.

Family Size

The family size is one of the factors that affect the nutritional status of any person and the extent of help available for carrying out handloom operations. Majority of the families of male (94 %) and female (62 %) adults respectively had less than five members highlighting the predominance of small family norms. Remaining 4 and 5 per cent of the families of male and female respectively had more than 7 members (large families) and 5-7 members (medium families). The present study revealed that nowadays people are becoming more inclined towards the benefits of small family norms.

Income

Table II and Figure 1. present the total monthly income of the families of the handloom weavers

Table 2. Total monthly income of the families of the handloom weavers

Income Rs*	Male (474)		Female (39)		Total (513)	
	No.	%	No.	%	No.	%
<3300	132	28	9	23	141	27
3301-7300	264	56	21	54	285	56
7301-14500	78	16	9	23	87	17
>14500	0	0	0	0	0	0
Total	474	100	39	100	513	100

*11th Five year plan 2007-2012

According to income classification of 11th Five year plan (2007-2012) a majority of 56 and 54 per cent of the families of male and female adults belonged to low income category with Rs.3301-7300 income per month and 16 and 23 per cent of them belonged to middle income category with Rs. 7301-14500 per month. Only 28 and 23 per cent families of male and female adults were earning less than Rs. 3300 per month, whereas

none of the families were earning more than Rs. 14500 per month being the high income range.

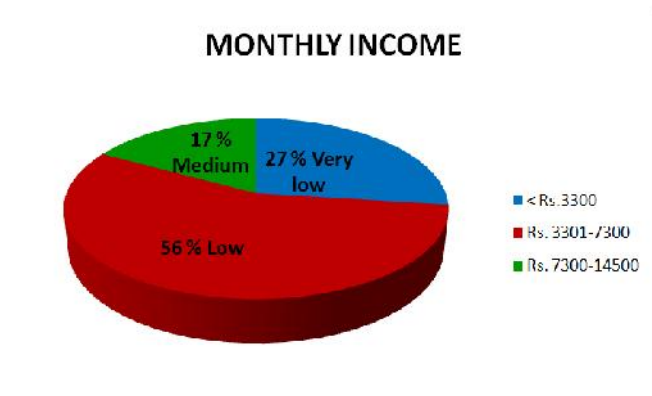


Figure 1. Monthly income of the families

Nutritional Status of the adult handloom weavers

Assessment of the nutritional status is most important as the physical health of the person results from consumption and utilization of food in the body and also enables to get a clear cut idea about nutritional deficiency.

Anthropometric measurements

The mean height, weight and body mass index of 513 handloom weavers is presented in Table III

Table 3. Mean height and weight of the selected handloom weavers compared with icmr (2010) values

Parameters	Men (N=474)			Women (N=39)		
	ICMR (2010)	Mean \pm SD	Deficit/ Excess (%)	ICMR (2010)	Mean \pm SD	Deficit/ Excess (%)
Height (cm)	172	164.6 \pm 6.8	-4.3	161	162 \pm 5.2	+0.6
Weight (kg)	62	69.07 \pm 10.4	+11.4	56	70 \pm 8.7	+25

The mean height of the selected men was recorded to be 164.6 cm which was found to be lesser than that of 172 cm suggested by ICMR (2010). Height indicates the long term nutritional status. In the present study the selected weavers were found to be slightly short statured. A deficit of 4.3 per cent was noted in comparison with ICMR values. The mean weight of the selected men was found to be 69.07 kg which was greater than that of 62 kg referred by ICMR (2010). The mean weight was found to be 11.4 per cent in excess of ICMR values. Most of the men were found to be slightly obese in the present study. The mean height of the selected women was recorded to be 162cm which was found to be slightly greater than that of ICMR (2010) reference values. The values were 0.6 per cent in excess of ICMR values.

The mean weight of the selected women was found to be 70 kg which was greater than that of ICMR (2010) values with an excess per cent of 25. The findings of the study indicated that most of the women were found to be obese.

Table IV presents the details regarding the Body Mass Index of the selected adult handloom weavers

Among men, 34 per cent being the maximum had BMI values within normal range and only 6 per cent of men came under the category of underweight. Nearly 25 and 14 per cent of men were in the category of pre obese and obese class I respectively. There were also 11 and 10 per cent of men in obese class II and obese class III category respectively. A majority of 38 per cent women had BMI values within normal range but none of the women came under the category of underweight. Nearly 26 and 15 per cent of women were in the category of pre obese and obese class I respectively. It was also noticed that 13 and 8 per cent of women were in obese class II and III respectively. The overall picture of the BMI values of the handloom weavers indicated that nearly one third of men and women under study were in the normal category whereas a majority of men and women were in obese category of three types.

Table IV presents the details regarding blood Haemoglobin levels of the selected adult men handloom weavers.

Table 4. Body mass index of the selected men and women

Classification	BMI class*	Men (N=474)		Women (N=39)	
		No.	%	No.	%
Underweight	<18.50	29	6	0	0
Normal	18.50-24.9	161	34	15	38
Pre-obese	25.00-29.9	120	25	10	26
Obese class I	30.0-34.9	67	14	6	15
Obese class II	35.00-39.9	51	11	5	13
Obese class III	40.00	46	10	3	8
Total		474	100	39	100

*WHO (2004)

The normal haemoglobin level suggested by the World Health Organisation is 13 g per 100 ml for an adult male. It is found that 70 per cent of men had levels ranging from 7 to 9.9g/dl suggesting a higher prevalence of moderate anaemia. Mild anaemia was found among 14 per cent men and severe anaemia was found among another 14 per cent of men. Only 2 per cent of men had normal levels. The overall picture revealed a high prevalence of anaemia of different categories which may interfere with their nutritional status and work performance.

Table 6. Present the information regarding the clinical signs and symptoms of the selected adult handloom weavers

Table 5. Haemoglobin levels and the category of anaemia of the selected men

Haemoglobin Level *	Category of Anaemia	Number	Per cent
<7 g/dl	Severe	57	14
7-9.9 g/dl	Moderate	283	70
10-12.9 g/dl	Mild	56	14
>13g/dl	Normal	7	2
Total		403	100

*WHO standard 1992

Among the clinical symptoms dental caries, short sight, sleep disturbance, improper digestion, joint and muscle pain was reported by a maximum of 45, 49, 45, 49, 61 and 46 per cent of men handloom weavers respectively. Mental tension and general fatigue were found among 41 and 40 per cent of adults respectively. Other clinical symptoms like thin hair, pale and

dry face, wrinkled skin, poor and brittle nails, bleeding gums, dimness of vision, long sight and behavior disturbance were also reported among 16-19 per cent of adults. Among the clinical symptoms dimness of vision, bleeding gums, joint pain and muscle pain were reported by a maximum of 79, 74, 90 and 67 per cent of women handloom weavers respectively. Other clinical symptoms like brittle hair, dryness of face, dental caries, short sight and behavior disturbance was reported by a maximum of 54, 59, 59, 59 and 59 per cent of women handloom weavers respectively. General clinical examination showed greater prevalence of dental caries, short sight, muscle pain, joint pain and general fatigue among handloom weavers.

Table 6. Clinical signs and symptoms of nutritional deficiencies among handloom weavers

Organs	SYMPTOMS	Men (N=474) Per cent		Women (N=39) Per cent	
		No.	%	No.	%
Hair	a) Brittle	47	10	21	54
	b) Thin hair	85	18	18	46
Skin	a) Dryness	41	9	16	41
	b) Wrinkling	80	17	13	33
	c) Allergy	13	3	2	5
Face	a) Pale	89	19	21	54
	b) Dryness	70	15	23	59
Nails	a) Poor nail growth	92	19	14	36
	b) Brittle nails	76	16	17	44
	c) White spots on finger nails	94	20	11	28
	d) Transverse lines	33	7	13	33
Teeth & Gums	a) Bleeding gums	96	20	29	74
	b) Dental caries	212	45	23	59
	c) Decay	54	11	12	31
Eyes	a) Dimness of Vision	84	18	31	79
	b) Short sight	232	49	23	59
	c) Long sight	122	26	20	51
Nervous system	a) Behaviour disturbance	92	19	23	59
	b) Sleep disturbance	212	45	16	41
	c) Mental tension	196	41	13	33
Respiratory system	a) Breathing problems	40	8	8	20
	b) Asthma	12	2	21	54
	c) Cough & cold	132	28	17	44
Digestive system	a) Ulcer	20	4	13	33
	b) Improper digestion	234	49	11	28
Extremities	a) Edema	7	1	3	8
	b) Joint pain	290	61	35	90
	c) Muscle pain	218	46	26	67
	d) General Fatigue	192	40	17	44

Food Intake

The mean food intake of 60 selected men handloom weavers (12 per cent of total sample) from Thiruvannamalai district is given in Table VII

In the competitive environment textile sector has adversely affected the operation and growth of traditional handloom industry in rural areas, making many traditional weavers financially weaker, reflecting a deterioration in their socio-

economic and livelihood status. The present study examines the changing livelihood conditions of the weaver community with regard to their food security and quality of food intake. From the food intake table it is found that the intake of green leafy vegetables, fruits, milk and milk products, sugar and jaggery were found to be deficit by 60, 49 and 68 per cent respectively. It is also observed that consumption of cereals was found to be deficit by 23 per cent. The consumption of pulses, roots and tubers and other vegetables was found to be slightly in excess by 2, 22 and 3 respectively, whereas fat intake was found to be highly in excess of 50 per cent. General findings indicated that consumption of health promoting foods like green leafy vegetables, fruits, milk and its products were found to be inadequate which may reflect in poor nutritional status.

Table 7. Mean food intake of selected men handloom weavers (N=60)

S. No	Foods	RDA (g)*	Actual intake (g)	Excess/deficit (%)
1.	Cereals	440	340	-23
2.	Pulses	45	46	2
3.	Green leafy vegetables	100	32	-68
4.	Roots and tubers	50	61	22
5.	Other vegetables	40	41	3
6.	Fruits	30	12	-60
7.	Milk & Milk products	200	103	-49
8.	Fats and oil	30	45	50
9.	Sugar and Jaggery	40	13	-68

* ICMR, (2009)

Nutrient Intake

Table VIII presents the mean nutrient intake of 60 selected men handloom weavers from Thiruvannamalai District in comparison with Recommended Dietary Allowance (ICMR, 2010).

Table 8. Mean nutrient intake of selected men handloom weavers (N=60)

S. No	Nutrients	RDA* (2010)	Mean intake	Excess / Deficit (%)
1.	Energy (kcal)	2730	2027	-26
2.	Protein (g)	60	49	-18
3.	Fat(g)	30	44	47
4.	Calcium(mg)	600	245	-59
5.	Iron(mg)	17	16	6
6.	-carotene (mcg)	4800	649	-86
7.	Thiamine (mg)	1.4	1.4	0
8.	Riboflavin (mg)	1.6	1.7	6.25
9.	Niacin (mg)	18	17	-5.5
10.	Vitamin B ₆ (mg)	2.0	0.39	-81
11.	Folic Acid	200	110	-45
12.	Vitamin C (mg)	40	27	-32

*ICMR (2010)

From the Table it is observed that energy intake was found to be slightly inadequate by 26 and protein intake by 18 per cent. Very low consumption of green leafy vegetables and fruits has reflected in an inadequate intake of calcium by 59 per cent and carotene by 86 per cent respectively. There was a deficit intake of Vitamin B6 (81 %) Folic acid (45 %) Vitamin C (32 %) and niacin (5.5 %). There was an excess intake of fat by 47 per cent, riboflavin and iron by 6 per cent respectively among weavers.

The general observation from the nutrient intake data revealed that there was an excess intake of fat, iron and riboflavin than the recommended dietary allowance (RDA) whereas there was a deficit of energy, protein, calcium, -carotene, niacin, vitamin B6, folic acid and Vitamin-C. The main reasons for deficit include low food intake, work stress and poor socio economic status. This requires proper nutrition education among the handloom weavers to avoid health problems.

Drinking water

Safe drinking water is of paramount importance for healthy living. Since independence, the government has been undertaking various programmes to provide safe drinking water to the masses. Availability of safe drinking water and its use by the households of the surveyed handloom weavers have been studied. Among the 513 surveyed households, the present study revealed that 79 per cent were not getting safe drinking water. Only 21 per cent of the weaver families were getting safe and protected drinking water.

Occupational Health problems of Handloom weavers

Health is wealth. The World Health Organization defined health in its broader sense as a state of complete, physical, mental and social well being and not merely the absence of disease or infirmity. Numerous studies and reports have raised concern over occupational health and safety of workers in India. Choobineh (2004) studied the role and importance of small scale industries together with the issue of occupational health problems and their causes in Iranian hand woven carpet industry as a typical informal small-scale industry in the industrially developed world. Agnihotram (2005) studied the condition of adult carpet weavers in Mirzapur and reported respiratory problems as the major occupational risk and the causal factors are carpet dust particles. The Second National Commission on Labour (2002) has identified the reasons for serious health hazards of workers in textiles and block printing activities by using dyes and chemicals and reported that there were poor physical working condition and improper ventilation at their work place (Bassey *et al*, 2011). The present study found that 87 per cent being the majority had inadequately ventilated houses whereas only 13 per cent of them had properly ventilated houses.

It is common for handloom weavers to suffer from a variety of occupational health problems and they become severe and acute, as they become aged. Occupational diseases are induced by prolonged work, excessive physical exertion, association of psychological stress in work, harmful nature of materials used by the weavers, and working in poor ventilated and illuminated conditions (Nupur Bahl, 2011). Some of the health problems associated with handloom weavers included poor eye sight, early cataract, loss of vision, high or low blood pressure, heart problems, respiratory problems, arthritis and musculo-skeletal disorder. The other important serious health problems akin to handloom weavers are those related to malnourishment. This is largely evident by their disproportionate body structure, underweight, loss of hair and anemia. The aging process among the handloom weavers appears to be very rapid. A vast majority of

them appear much older than their age due to excessive body movement during the weaving activity.

Table IX presents the details regarding the health problems reported by the selected handloom weavers.

Table 9. Health problems among the selected handloom weavers

Problems	Men (474)		Women (39)		Total	
	No.	%	No.	%	No.	%
Breathing problem	40	8	8	20	48	9
Muscle Pain	218	46	26	67	244	47
Joint pain	290	61	35	90	325	63
Diabetes Mellitus	50	11	1	3	51	10
Blood Pressure	42	9	0	0	42	8
Ulcer	20	4	13	33	33	6

The results of the study indicated that 63 per cent being the majority of the Handloom weavers had joint pain 47 per cent were suffering from muscle pain. The findings revealed that muscle and joint pain were experienced by majority of handloom weavers which might be due to their posture at work place. Lesser percentage of people expressed health problems like diabetes mellitus, breathing problems, blood pressure and ulcer (6 to 10 %).

Conclusion

Studies on the handloom weavers of Thiruvannamalai District are not available particularly about their socio economic background, health and nutritional status. This research was hence aimed at studying the socioeconomic background dietary pattern and nutritional status of 513 handloom weavers. The findings of the present study indicated that among the surveyed weavers majority were in the age group of 40-50 years, nearly 50 per cent had studied up to primary school, nuclear families were found to be 94 per cent and small family norms were found among 91 per cent of families. Majority of the families (56%) earned a monthly income of Rs. 3300-7300. Anthropometric measurements indicated that both men and women had body weights in excess of 11.4 and 25 per cent respectively than ICMR (2010) values. BMI values revealed that one third of the weavers were found to be normal whereas a majority were in obese category of three types. The clinical symptoms like dental caries, short sight, sleep disturbance, improper digestion, joint pain and muscle pain were reported by a maximum of 45, 49, 45, 49, 61 and 48 per cent of handloom weavers respectively. Blood hemoglobin levels revealed that 70 per cent of men had levels ranging from 7 to 9.9g/dl suggesting a higher prevalence of moderate anaemia. Mild anaemia was found among 14 per cent men and severe anaemia was found among 14 per cent of men. Only 2 per cent of men had normal levels. From the study it might be concluded that higher body weights, poor socio economic background and occupational health problems are strongly associated with increased risk of non-communicable diseases.

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