



INTRODUCTION

There are a number of basic capabilities that no society can afford to ignore: nutrition, health, literacy, self-respect and political participation

- *Amartya Sen*

Even though a country may possess abundant physical resources, it cannot make rapid economic and social advancement unless human resources are properly mobilized. Human resources are perhaps the most strategic and critical determinant of growth of a nation and yet its development has not received the required attention.

Countries with hardly any natural and physical resources have achieved tremendous economic growth by harnessing the human resources in the right path Japan, a notable example. India has abundant human resources and it occupies the second populous country next to china. The knowledge, skills, attitudes and the initiative of the people if utilized fully, it can contribute greatly towards the country's economic development.

Poor nutrition and the resultant poor health, lack of education and sanitation lower the working capacity of people, impede their progress and thereby national development. Recent efforts to overcome poverty and the problems it spawns have placed human resource development at the top of many national development agendas.

The purpose of human resource development is to enhance the learning process and understand the human potential, improve their performance in work-related systems and contribute to sustainable human development. Human resource development plays a more fundamental and key role in solving critical economic and social problems faced by communities and organizations (Reid, 2002).

Human resource development lies at the heart of economic, social and ecological growth. It is also a very important factor for achieving internationally agreed sustainable improvement of goals, as well as the Millennium Development Goals, and for increasing opportunities to all people, predominantly the majority of

vulnerable groups and individuals in society. Human resource development has been defined as empowering people by fostering the contributory capacities that they can bring to the improvement of their own quality of life and that of their community, family, enterprise and society. Over the years, the concept of human resource development has evolved from solely focusing on individual capacity to also building institutional capacity at the national level, through socio-economic policies and development plan and strategies. Human resource development is, therefore, regarded as facilitating the development of national human capacities to achieve sustainable, inclusive, equitable development and, at the same time, enhance well-being of individuals and the community. Human resource development strategies are increasingly part of national development planning. (www.un.org/en/development/desa/oesc/humanresources.shtml).

India has got various programs of development for building up the country's human resources, specially education and health measures for the development of backward classes, and programs for raising technical skills and scientific research (Chaudhary, 2009).

The study of human resources is vital from the point of view of economic welfare. It is particularly important because human beings are not only instruments of production but also ends in themselves. It is required to recognize in quantitative terms the number of people living in a country at a meticulous occasion, the speed at which they are increasing and the composition and allocation of population. The basic purpose of planning in India is to widen people's choices and improve the well-being of the people. In this context, human development is the key issue so that people could lead a long and hale and healthy life and achieve a decent standard of living (Ruddar *et al.*, 2000).

The population of India according to 2011 Census was 1.21 billion. India is one of only two countries in the world with a population of more than 1 billion people. The other is China, with a population of 1.39 billion. A recent report from the United Nations suggests that India's population will surpass China by 2028, when both India and China will have populations of 1.45 billion (World Population Review, 2014). Adults constitute 60 per cent out of the total population of India and they are the

major work force of the country (Census of India, 2011). Their health and well being are of great importance since they contribute to the country's economy.

Indian economy is a developing economy. The nature of employment and unemployment, therefore sharply differs from industrially advanced economies. Indian economy is predominantly a rural economy, where two-third of its labour force is still dependent on agriculture (Chaudhary, 2009).

Employment structure implies the occupational pattern of work force in a country or the distribution of its population among various occupations. Occupations structure is usually divided into primary, secondary and tertiary sectors. Agriculture, animal husbandry, forestry, fishery etc. are collectively known as primary activities or industries. They are primary because their products are essential or vital for human existence and they are carried on with the help of nature. Manufacturing industries, both small and large scale are known as secondary activities. Transport, communication, banking, finance and services are tertiary activities which help the primary and secondary activities in the country (Government of India, 2006).

Agriculture is the main occupation of the people. Besides agriculture, people engaged themselves in weaving, tanning and metallurgy (www.indiansaga.com/history/aryans-occupational.html).

Among the various occupations weaving is one of the second major occupation in India next to agriculture. A long tradition of excellence in its craftsmanship, Indian handloom is said to have dated back to the ancient ages. August 15, 1947, marked a turning point for the country's handloom weavers. Mahatma Gandhi's use of the charkha, or the spinning wheel, as a symbol of national regeneration and the subsequent focus on the handloom weavers during the freedom movement was largely responsible for the breakthrough (Rajesh Shukla, 2014).

According to Tiwari *et al.* (2003) textile industries are the oldest occupation in India. A review of textile industry quotes that it is the largest manufacturing sector in India, accounting for about 20 per cent of India's industrial output and 37 per cent of total exports.

India has a rich cultural heritage of handloom industry and world famous workmanship of hand-woven textiles. Fascinating motifs and super design of the fabric assigned special importance to the sector (Singh and Naik, 2009).

Indian Textile Industry has an overwhelming presence in the economic life of the country. Apart from providing one of the basic necessities of life, the textile industry also plays a pivotal role through its contribution to industrial output, employment generation and the export earnings of the country. It contributes about 14 per cent to the industrial production, 4 per cent to the GDP, employs 45 million people and 11 per cent to the country's export earnings. The textile sector is the second largest provider of employment after agriculture (Government of India, Ministry of Textiles, 2013).

The features of handloom sector vary across the country. In some parts of Kerala, Tamil Nadu, Assam and Orissa, it has attained the status of a mature industry and in other parts, it is still an enterprise confined to the needs of the household. India has a rich cultural heritage of handloom industry and world famous workmanship of hand-woven textiles. The handloom sector, with a long tradition of excellence in craftsmanship, not only plays an important role in preserving the country's heritage and culture, it also makes a major contribution to the economy. (www.indianhandloomscluster-dchl.net/Doc/DSTUDY/Bijohnagar.doc).

India is also the largest consumer of silk sarees in marriages by the brides as a tradition and followed specially in southern parts of India. Handloom forms a precious part of generational legacy and exemplifies the richness, which has been kept alive by skilled weavers and designers engaged in the age-old tradition of weaving. The designers with the skillful blending of myths, faiths, symbols and imagery provide the fabric an appealing dynamism. Their strength lies in innovative designs, which cannot be replicated by the power looms. Handloom sector contributes nearly 15 per cent of the cloth production in the country and nearly 95 per cent of the World's hand-woven fabric comes from India (Shanmuga Sundaram and Prakash, 2014).

Workers use handlooms and the process includes use of different yarns or threads interlaced at right angles to make the clothes. Typically the entire family is involved and the older individuals mostly perform skill-based activities. The weaving of cloth demands good vision for distance and near as the process involves spinning yarn or threads and use of fine tools for patterns on the cloth. Visual impairment limits worker productivity and may affect the economic status of the family (Marmamula *et al.*, 2011).

Prachi (2010) has observed that Indian handloom is growing in its popularity not only among the people in India, but also among the people admiring Indian handloom and Indian handicrafts from around the globe. In spite of having distinct styles and ways of weaving, there is a lot of exchange of styles that happened among the diverse Indian handloom styles.

According to Krishna, (2000) based on the estimates available, around 25 per cent of all the handlooms in India are located in Tamil Nadu, providing employment for more than two million people, including ancillary workers engaged in preparatory processes of the country's total export to which Tamil Nadu contributes a share of 50 per cent.

Babu and Ramesh (2001) observed that handloom is the largest industry in the unorganized sector in terms of size, income and employment potential. Handloom sector accounts for about 30 per cent of the total textile production and about 60 per cent of the employment in the textile industry. Handloom weavers in the country are mainly concentrated in seven states as in Assam, West Bengal, Tamil Nadu, Manipur, Uttar Pradesh, Maharashtra and Andhra Pradesh. Among the South Indian States, Tamil Nadu is the most important in terms of the size of weavers population and share of total production.

In Tamil Nadu, there are more than 3 lakh handloom weaving families. In comparison with other traditional rural sectors, handloom weaving is a full-time family profession, involving all the members of the family (Jayavel, 2013). Tamil Nadu and Textile Industry (2011) have mentioned that the state government has taken several steps to encourage weavers to boost handloom industry in the state. The state government with the co operation of the Central Government has formulated several schemes to improve the socio-economic conditions of the weavers belonging to the handloom industry.

People with lower socio economic status have lower life expectancy, more activity limitations due to chronic disease, lower well-being and more restricted access to health care than people with higher socio economic status (Spiro, 2001). Socio economic status of an individual is an environmental factor which has been identified as an important determinant of human health (Adler and Ostove, 2000).

Weavers are the main population in India who suffer from major health problems such as respiratory problems, musculoskeletal disorders and chronic diseases like hypertension as well as disabilities such as permanent hearing loss due to exposure to noise (Kale, 2008).

A study on occupational hazard in textile industries revealed that most of the workers and family members suffer from either asthma or allergy or Tuberculosis or from frequent attacks of cold. Only few or negligible people suffered from cancer. Other strange ailments include nose block and throat infection. Further it is also found that the number of weavers who suffered from skin problem was less than the number of weavers who faced respiratory problems which was the major occupational health hazards (Kandasamy and Minor, 2001).

Long hours of static work with awkward posture at traditionally designed looms can cause high prevalence of musculoskeletal disorders (MSDs) among weavers (Anonymous, 2006).

Malnutrition is the primary cause for wastage of human resources and a subsequent degradation of society. It is imperative that the weavers maintain good health in order to shoulder the responsibilities. As a result of malnutrition the capacity to work is lowered because of apathy, lethargy, lack of initiative and stamina. In additionm increased susceptibility to infection and consequent absenteeism from work lead to lowered productivity which is a potential source of loss to the nation.

Health is related to the food consumed. To maintain good health, ingesting a diet containing the nutrients in correct amounts is essential. A balanced diet is one which contains different types of food in such quantities and proportions so that the need for calories, proteins, fats, minerals and vitamins is adequately met and a small provision is made for extra nutrients to withstand short duration of leanness. Deficiency of any nutrient affects health of an individual. Food has not only nutrients but also nutraceuticals which prevent degenerative diseases. Good nutrition is the basic requirement for positive health, functional efficiency and productivity. Nutrition science provides abundant evidence for the importance of nutrition not only in promoting proper physical growth and development but also in ensuring adequate cognitive development and work capacity (Francis, 2003).

According to National Family Health Survey (NFHS, 2005) data on nutritional status of adult men and women, prevalence of under nutrition in adults is higher in rural areas and over nutrition is higher among 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.

Nutrition is an important factor in the health status of adulthood (Gerber *et al.*, 2003). Nutrition is an essential input for national development. A healthy well nourished population lays the best foundation for promoting national productivity and progress.

Assessment of nutritional status of handloom weavers who form a major segment of productive labour need to be undertaken to identify the factors contributing to their present state of health and nutritional status. The state of the body with respect to each nutrient and to the overall state of the body is known as nutritional status and the assessment of the state of nourishment is termed as assessment of nutritional status (Trivedi *et al.*, 2006). There are a number of methods available for assessing the nutritional status most important among them include anthropometry, biochemical, clinical and dietary assessment. Based on the findings strategies can be identified and implemented. Dietary intervention accompanied by nutrition education can be a cost effective approach to improve the health and nutritional status of adult handloom weavers. Use of known functional foods for the management of non communicable disease may be more promising.

According to Thomas and Earl (2001) a functional food is any food or food ingredient that provides health benefit beyond the traditional nutrients it contains. Melissa, (2006) stated that functional foods influence specific functions in the body and thereby offer benefits for health, well being or performance beyond their regular nutritional value.

Functional food must remain as food and it must demonstrate its effects in amounts that can normally be expected to be consumed in the diet, it is not a pill or a capsule but a part of the normal food pattern (Robertroid and Marul, 2007).

Functional foods are being similar in appearance to conventional foods and are consumed as part of a usual diet and are known to improve health status and

render physiological effects beyond basic nutritional function expected of conventional foods (Fereidoon, 2007).

Some of the functional foods are amla, flax seeds, soya, blue berry, carrot, cruciferous vegetables, fish, garlic, whole grams, oats, oranges, spinach etc. A number of low cost locally available functional foods were selected and used for the formulation and preparation of health mixes to be used for supplementation of handloom weavers based on their existing health conditions.

Bengal gram dhal is good for diabetics because it has a low glycemic index. The glycemic index is lower for foods that raise blood glucose levels slowly (David, 2014).

Whole black gram is a rich source of protein, fiber, several vitamins and essential minerals such as calcium and iron. Black gram being rich in nutraceuticals and dietary fibers are gaining importance because of their benefits (Idrees, *et al.*, 2013). Polyphenols, carotenoids and dietary fibre have a role in prevention of cardiovascular disease, cancer and diabetes (Girish, *et al.*, 2012).

Carrots are noted for their rich antioxidants, including nutritional antioxidants such as vitamin A, C, E, β carotene and polyphenolic compounds (Luciano *et al.*, 2009). Carrot contains carotenoids which have been linked with the enhancement of immune system and decreased risk of degenerative diseases such as cancer, cardiovascular disease, age related muscular degeneration and cataract formation (Mathews-Roth, 2000). Carotenoid also acts as free radical scavengers and is very important for health (Bast *et al.*, 2000).

Tomatoes consist of C and E vitamins and each of these vitamins have antioxidant properties. In addition, phenolic and flavonoid compounds are found in tomatoes. It has been used for recovering from some diseases, ear pain, typhoid, yellow fever, colitis, arthritis, decreasing blood glucose and cholesterol, regulating blood pressure and reducing heart diseases (Blum *et al.*, 2006).

The edible portion of cauliflower is curd, whereas its leaves which are generally thrown away as waste are also rich source of iron and β -carotene and thus can be utilized in various value added products (Kowsalya and Sangeetha, 1999). It is considered as a rich source of dietary fiber and possesses both antioxidant and anti carcinogenic properties (Podsdek, 2007).

Amla (*Emblica Officinalis*) has significant antihyperglycemic and antihyperlipidemic effects in diabetic patients (Akhtar *et al.*, 2011).

Flax seed meal is also a source of high quality protein with favourable ratio of essential amino acids to human nutrition. Lysine being the limiting amino acid making flax seed suitable to complement cereal and legume proteins (Daun *et al.*, 2003). The consumption of different byproducts of flax seed meal has been associated with the levels of α -linolenic acid in blood, oxidative prevention and regulation of glucose metabolism (Pan *et al.*, 2009).

According to comprehensive update of soy research by the nutrition committee of the American Heart Association (AHA) published in 2000, eating 50g of soy a day lower LDL cholesterol by 3 per cent (Sacks, 2006).

Sharon, (2007) reported that herbs and spices play an important role as antioxidant, antimicrobial and antiviral agents. Diet plays an important role which reduces the risk of diabetes and heart diseases. Consumption of natural foods such as fruits, vegetables, nuts, lean meat and fish help in regulating the blood sugar level and prevent non-communicable diseases.

Diet has long been linked to the development of obesity, diabetes and heart diseases and dietary modification is one of the cornerstones of chronic disease prevention (Rao, 2010). The health benefits of a diet rich in fruits, vegetables and legumes have been recognized. There is a substantial amount of evidence that nutrients contained in fruits and vegetables such as dietary fibre, folate, antioxidant vitamins and potassium are associated with lower risk of chronic diseases (Ullah and Khan, 2008). Food based approach is coming to the forefront as a major modifiable determinant of chronic diseases, with scientific evidence increasingly supporting the view that alterations in diet have strong effects on health throughout life.

“To eat is a necessity, but to eat intelligently is an art”

- La Ro Che Frocauld

A nutritious diet follows the a, b, c, m, v principles – Adequacy, Balance, Calorie control, Moderation and Variety (Mahan and Stump, 2005). Handloom weavers have diet related health problems. Usually weaving communities have

crowded, poorly ventilated and lighted rooms. Weavers have to work under unhygienic conditions causing health problems. Moreover the working time in such poorly managed environment is 12 hours. They have to work in shifts i.e., morning and evening. Sometimes, it takes 14-16 hours and they continuously have to sit on carpet (weaving machine) without any rest. According to Occupational Health Study in Carpet weaving industry, main health and safety hazards faced by weavers, included musculoskeletal problems due to odd squatting position and vision disorders due to continuous attention required during work, and chemical hazards due to inhalation of wool.

There are not much information available regarding the health and nutritional status of handloom weavers. It is imperative that more attention must be given to obtain data on their health and nutritional status and find out ways and means of overcoming such problems.

Based on health and nutritional status of handloom weavers, functional food mixes can be developed and supplemented to them and the impact can be evaluated. Moreover for a wholesome improvement, nutrition education can be imparted using effective, inexpensive methods which will also change their Knowledge, Attitude and Practice. Work place is an important venue for reaching adult workers and their families about health related behavior. Work place health promotion pays dividends not only through improved employee health but also improved morale, which in turn results in enhanced productivity and organizational commitment (Hakajima, 2000).

With this background the present study on the **Effect of Supplementation of Health Mix and Nutrition Education on the Health and Nutritional Status of Handloom Weavers** was undertaken with the following objectives

To

- Study the socio economic back ground, dietary pattern, occupational health problems, life style and work pattern of handloom weavers
- Assess their nutritional status, work output and energy balance

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- Formulate health mixes using locally available functional foods and evaluate the nutritive value, anti nutritional factors, shelf life and cost of the health mixes
 - Supplement the health mixes to weavers based on their health problems for a period of four months
 - Assess the impact of supplementation of health mixes and
 - Implement nutrition education programme and evaluate the impact on handloom weavers.