CHAPTER –I

INTRODUCTION
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1.1 INTRODUCTION

Health is Wealth for all. India is one of the few countries in the world where women and men have nearly the same life expectancy at birth. The fact that the typical female advantage in life expectancy is not seen in India suggests there are systematic problems with women’s health. Indian women have high mortality rates, particularly during childhood and in their reproductive years. The health of Indian women is intrinsically linked to their status in society. Research on women’s status has found that the contributions that the Indian women make to families often are overlooked, and instead they are viewed as economic burdens. Poor health has repercussions not only for women but also their families. Women in poor health are more likely to give birth to low weight infants. They also are less likely to be able to provide food and adequate care for their children. Finally, a woman’s health affects the household economic well-being, as a woman in poor health will be less productive in the labour force.

1.2 IMPORTANCE OF HEALTH

Improvement in the health status of the people has been one of the major thrust areas for the social development programs of the country. Over the last five decades, India has built up vast health infrastructure and manpower at primary, secondary and tertiary care in Government, voluntary and private sectors. The population has become aware of the benefits of health related technologies for

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prevention, early diagnosis, and effective treatment as well as rehabilitation for a wide variety of illnesses\textsuperscript{2}. Technological advancement and improvement in access to health care technologies, which were relatively inexpensive and easy to implement, had resulted in steep decline in mortality between 1950 and 2010. The extent of access and utilization of health care varied substantially between States, districts and different segments of society\textsuperscript{3}.

Health is determined by many factors among which medical care is only one. Indeed, it has become increasingly accepted that medical care is not usually the major determinant of health. Other determinants, such as food, eating, housing conditions and work environment, play equally if not more important roles than medical care. There has also been a growing realisation that very little is known about effectiveness of much of modern medicine. Such evidence that does exist indicates that modern sophisticated techniques are often less effective than the simpler techniques they replace\textsuperscript{4}. Health economics reflects a universal desire to


obtain maximum value for money by ensuring not just the clinical effectiveness, but also the cost-effectiveness of healthcare provision\(^5\).

1.3 THE CONSTITUTION OF INDIA - PROVISIONS RELATING TO WOMEN

The Constitution of India not only grants equality to women, but also empowers the State to adopt measures of positive discrimination in favour of women for removing the cumulative socio-economic, educational and political disadvantages faced by them\(^6\).

Advancement of Women through Five Year Plans

There has been a progressive increase in the Plan outlays over the last six decades of planned development to meet the needs of women and children. The outlay of Rs. 4 Crores in the First Plan (1951-56) has increased to Rs. 7,810.42 crores in the Ninth Five Year Plan, and Rs. 13,780 Crores in the Tenth Five Year Plan. There has been a shift from “welfare” oriented approach in the First Five Year Plan to “development” and “empowerment” of women in the consecutive Five Year Plans.


\(^6\) Statistics on Women In India, National Institute of Public Cooperation and Child Development, 5, Siri Institutional Area, Hauz Khas, New Delhi, pp-1-2.
### Table 1.1

**Perspectives on Advancement of Women through Five Year Plans**

<table>
<thead>
<tr>
<th>Period</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Five Year</td>
<td>It was mainly welfare oriented as far as women’s issues were concerned. The Central Social Welfare Board (CSWB) undertook a number of welfare measures through the voluntary sector. The programmes for women were implemented through the National Extension Service Programmes through Community Development Blocks.</td>
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<tr>
<td>(1951-56)</td>
<td></td>
</tr>
<tr>
<td>Second Five Year</td>
<td>Efforts were geared to organise “Mahila Mandals” (women’s Plan groups) at grass-roots levels to ensure better implementation of welfare schemes</td>
</tr>
<tr>
<td>(1956-61)</td>
<td></td>
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<tr>
<td>Third, Fourth,</td>
<td>They accorded high priority to women’s education. Measures to improve maternal and child health services, and supplementary feeding for children, nursing and expectant mothers were also introduced.</td>
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<tr>
<td>Fifth and other</td>
<td></td>
</tr>
<tr>
<td>Interim Plans</td>
<td></td>
</tr>
<tr>
<td>(1961-74)</td>
<td></td>
</tr>
<tr>
<td>Sixth Five Year</td>
<td>This is regarded as a landmark in women’s development. The Plan adopted a multidisciplinary approach with a three-pronged thrust on health, education and employment of women</td>
</tr>
<tr>
<td>Plan (1980-85)</td>
<td></td>
</tr>
<tr>
<td>Seventh Five Year</td>
<td>Development programmes for women were continued, with them into the mainstream of national development. A very significant step therein was to identify and promote</td>
</tr>
<tr>
<td>Plan (1985-90)</td>
<td></td>
</tr>
<tr>
<td>Eighth Five Year Plan (1992-97)</td>
<td>“beneficiary-oriented programmes” which extended direct benefits to women. It attempted to ensure that the benefits of development from different sectors did not bypass women. Special programmes were implemented to complement the general development programmes. The flow of benefits to women in the three core sectors of education, health and employment were monitored vigilantly. Women were enabled to function as equal partners and participants in the developmental process with reservation in the membership of local bodies. This approach of the Eighth Plan marks a definite shift from ‘development’ to empowerment’ of women</td>
</tr>
</tbody>
</table>
| Ninth Five Year Plan (1997-2002) | The Ninth Five Year Plan envisaged:  
  a) Empowerment of women and socially disadvantaged groups such as Scheduled Castes, Scheduled Tribes and Other Backward Classes and Minorities as agents of socio-economic change and development.  
  b) Promoting and developing people’s participatory institutions like Panchayat Raj institutions, cooperatives and self-help groups.  
  c) Strengthening efforts to build self-reliance.  
  d) The convergence of services from different sectors. |
<table>
<thead>
<tr>
<th>Tenth Five Year Plan (2002-2007)</th>
<th>The Tenth Five Year Plan was formulated to ensure requisite access of women to information, resources and services, and advance gender equality goals.</th>
</tr>
</thead>
</table>

**Source:** India, Planning Commission. (2002). Five Year Plans. New Delhi.

### 1.4 WOMEN STATUS IN TAMIL NADU

Women throughout the world play critical role in economic growth and development and their contribution have an impact on households, communities and national economies. Women contribute to the family economy, by participating in the labour force, thereby earning an income and contributing to the family and also by undertaking the primary responsibility for household maintenance, childcare and there by sustain the family.

The status of women is directly connected with their economic position, which in turn depends on opportunities for participation in economic activities. The economic status of women is now accepted as an indicator of a society’s stage of development. Participation of women in the work force has also been found to be an important element in the adoption of the small family norm, essential for the achievement of the twin goals of economic development and
population planning. It is of utmost importance therefore that the country makes full and effective use of its human resources by providing economic empowerment to women who constitute 50 percent of it. The long term objectives of the developmental programmes for women would be to raise their economic and social status in order to bring them into the mainstream of national development.

The women are ready to work for very low wages and for longer hours under exceedingly inhospitable conditions of work. Their “oriental docility” normally does not let them join unions and agitate against the management. The sole reason behind the differential distribution of male and female workers of different branches of industry is the gender gap in wages in manufacturing.

The economic conditions of women have profound effect not only on women’s own but also on that of their children and families and on subsequent generations. It is well recognized now that women make most healthcare decision at the family level and provide most of the informal health care. They look after the sick and the elderly, determine diet, maintain the immediate environment of the family and transmit attitudes and life styles. It is generally women’s rather than men’s’ education, income and time that determine the health and nutritional status of children.\(^7\)

Women in developing countries are often in poor health and are overburdened with work, they are tired, most are anaemic and many suffer from

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malnutrition and parasitism and chronic ill health especially, during pregnancy and childbirth. Women’s special needs have often been ignored by health planners and women have thus had to bear a disproportionate share of unmet health needs (Raj kumar, 2000)

The occupational health in India gained momentum only after the tragic Bhopal gas incident in 1984, though the National Safety Council of India was set up by the Ministry of Labour, Government of India in 1966 and the pioneering effort of ICMR was established in 1911 for the formulation, coordination and the promotion of research. The global prevalence of Musculo Skeletal Disorder ranges from 14 to 42 %. Though India has seen tremendous developments in its economy and industrialization, there is a high incidence of MSD. The prevalence in Northern India has been reported to be as high as 59.4 per cent. Although several possible methods have been employed to determine the prevalence of MSD, the estimates based on health care resource utilization may underestimate its true prevalence and may probably be biased towards the more severe and symptomatic cases. Moreover, the estimates of the prevalence of MSD can also be hindered by the unavailability of the health-care data, inaccuracies in coding, as well as inconsistent physician recognition of the early disease. The limited existing information in the industrial sectors in Southern India stresses the need for estimating the prevalence of MSD in vulnerable sections of the population. Sivakasi, which is called as “A town of three industries”, which is home to Printing / Offset Printing Presses and industries of Pyrotechnics (Fireworks) and
Crackers and Safety Matches and Color Matches, was chosen for the study. The 2011 Census recorded a population of 71,170 (50% males and 50% females)

**Table 1.2 Protocol for Diagnosis**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rotator cuff tendinitis</strong></td>
<td>h/o pain in the deltoid region and pain on resisted active movement (abduction – supraspinatus; external rotation – infraspinatus; internal rotation – subscapularis)</td>
</tr>
<tr>
<td><strong>Shoulder capsulitis (frozen shoulder)</strong></td>
<td>h/o pain in the deltoid area and equal restriction of active and passive glenohumeral movement with capsular movement (external rotation &gt; abduction internal rotation)</td>
</tr>
<tr>
<td><strong>Lateral epicondylitis</strong></td>
<td>Epicondylar pain and epicondylar tenderness and pain on resisted extension of the wrist</td>
</tr>
<tr>
<td><strong>Carpal tunnel syndrome</strong></td>
<td>Pain or paraesthesia or sensory loss in the median nerve distribution, and one of: Phalen’s test positive, nocturnal exacerbation of symptoms, motor loss with wasting of abductor pollicis brevis</td>
</tr>
<tr>
<td><strong>Non specific diffuse forearm pain</strong></td>
<td>Pain in the forearm in the absence of a specific diagnosis or pathology (sometimes includes: loss of function, weakness, cramp, muscle tenderness, allodynia, slowing of fine movements)</td>
</tr>
</tbody>
</table>
Sivakasi- Mini-Japan, popularly known as mini-Japan possesses multifarious industries like Fireworks, Match Factories, Off-set litho presses which provide employment opportunities to a large mass of people in and around the city. The proud factor and also the noteworthy feature is that people are very industrious, paying attention much to their job. Sivakasi, a quaint little town in Tamil Nadu, is the biggest home to the fireworks industry. About 80% of India's fireworks are manufactured in this small town. Needless to add, almost the entire population of Sivakasi depends on the firework industry. Though the fireworks industry is the lifeline here, several printing press and match box factories here can also be found. All the printing required for the fireworks industry is also carried out here itself. Most of the factories are huge in size each spread across 30-120 acres in length and employing 1200-1500 people.

The industry thrives on manual labour and few processes are automated. The automated processes are carried out by machines run by labourers. Carrying inflammable items is prohibited in the factories and the work goes on from sunrise to sunset. There are, hence, no power supplies in any of the factories and even godowns have not been electrified for fear of fire. Around 75% of the labour force comprises women, most of whom are uneducated. Those associated with the factories claim that work is generally safe since most of the crackers do not need acids. Workers eat bananas as a common antidote to guard against constant exposure to chemicals, mainly aluminum. It is interesting to note that most factories offer a Rs 35 per week, banana allowance. The fireworks industry in Sivakasi is worth between Rs 800-10000
crores. The market for fireworks is likely to grow at the rate of 10% per annum. There are nearly 689 fireworks factories giving direct employment to about 40,000 workers and about 1 lakh indirect such as paper tube making, wire cutting, box making in the country side. Fireworks in Sivakasi also produce Military Weapons training items. They are used for training in armed forces. Some airports are using Sivakasi rocket to scare away birds to avoid bird hits of aircrafts.

1.5 CHEMICALS USED IN CRACKERS AND THEIR HARMFUL EFFECTS

- Lead: Affects the central nervous system in humans. When heated it can emit highly toxic fumes. Young children can suffer mental retardation and semi-permanent brain damage by exposure to lead.

- Magnesium: Inhalation of magnesium dust and fumes can cause metal fume fever. Particles embedded in the skin produce gaseous blebs and gas gangrene. Dangerous fire hazard in the form of dust or flakes when exposed to flames. Poisoning takes the form of progressive deterioration in the central nervous system.

- Zinc: Pure zinc powder is non-toxic to humans by inhalation but difficulty arises from oxidation (burning), as it emits zinc fumes. It stimulates the sensation of vomiting.

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• Manganese: Toxicity caused by dust or fumes. The main symptoms of exposure are languor, sleepiness, weakness, emotional disturbances, spastic gait and paralysis.

• Sodium: When heated in air, it emits toxic fumes of sodium oxide. Can cause dangerous fire hazard when exposed to heat and moisture.

• Potassium: Dangerous fire hazard and explosion can occur.

• Copper: Inhalation of copper dust and fume causes irritation in the respiratory tract. Absorption of excess copper results in "Wilson's disease" in which excess copper is deposited in the brain, skin, liver, pancreas and the myocardium (middle muscular layer in the heart).

• Cadmium: Its absorption can damage the kidneys and can cause anaemia. Cadmium causes increased blood pressure and also a disease called "Itai-Itai", which makes bones brittle resulting in multiple fractures.

• Phosphorous in the form of PO4: Dangerous fire hazard when exposed to heat or chemical reaction. Poison by inhalation, ingestion, skin contact and subcutaneous routes. Ingestion affects the central nervous system. Toxic quantities have an acute effect on the liver and can cause severe eye damage.

• Sulphur in the form of SO4: It affects the upper respiratory tract and the bronchi. It may cause edema of the lungs or glottis, and can produce respiratory paralysis poison to humans by inhalation. An eye, skin and mucous membrane irritant and corrosive.
• Nitrate: Highly inflammable and on decomposition they emit highly toxic fumes. The symptoms are dizziness, abdominal cramps, vomiting, bloody diarrhea, weakness, convulsions and collapse.

• Nitrite: Large amounts taken by mouth may produce nausea, vomiting, cyanosis, collapse and coma. Repeated small doses can cause a fall in blood pressure, rapid pulse, headaches and visual disturbances. When heated, emit highly toxic fumes of NOx. 

1.6 STATEMENT OF THE PROBLEM

In Sivakasi the first fireworks industry was started in the early 20th century. Having achieved a measure of success in safety matches, colour matches and star matches. Now, the existing factories broadened their efforts, there came into existence several new units, of which National Fireworks, Kaliswari Fireworks and Standard Fireworks were prominent in the year 1942. These three factories started marketing their products throughout the length and breadth of India. These were later supplemented by new units at the average of 10 per year. What started as 1 or 2 factories in 1923, rose to 3 in 1942, and by the year 1980 the number of factories had risen to 189. By the end of 2010 the total number of registered factories was 689 in Sivakasi alone.

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Sivakasi Fireworks Industries produces around 135 varieties using around six chemicals (aluminum and magnesium powder; potassium, strontium, barium nitrates; potassium chlorate; red phosphorous; zinc oxide; sulphur) as inputs. But it is the aluminum powder that is largely consumed. In the long run, due to synergistic effect of above mentioned chemicals in the presence of excessive heat and lack of ventilation, and improper ergonomic condition, the major occupational health problems which can be expected are many. Common acute occupational illnesses observed are allergic skin diseases, allergic lung disorders, and irritation of eyes with lacrimation, photophobia and conjunctivitis. Long working hours, exposure to excessive heat, low illumination, improper posture, overcrowded working space, continuous sitting in one posture can cause health problems like pain in joints, back pain, body ache, fatigue and other muscle-skeletal problems, resulting in stunted physical growth and development etc. Over and above many work induced psychological problems can’t be ruled out. The majority of the remaining population does not understand why the specifically poisonous chemical-mix from fireworks leads for more and more humans to heaviest health impairments and, yes, even to a death threat. Information on this subject is very much needed – and could perhaps influence the one or the other to feel responsible towards his/her neighbours and the environment and to renounce - without waiting for additional legal regulations – to letting-off fireworks altogether. Hence, the researcher wanted to choose the topic as women health status of fireworks workers in Sivakasi.
1.7 SAMPLE SIZE

In Sivakasi there are 689 fireworks factories registered in TANFAMA (Tamil Nadu Fireworks & Amorces Manufacturers Association) under 3 different licences. They are Nagpur Licence, DRO licence and Chennai Licence. The Nagpur licensed factories accounts for 510 factories, DRO Licensed factories accounts for 69 factories and Chennai Licence factories occupies 110 factories. Altogether, there are 689 registered fireworks factories runs under the Government regulation. According to the TANFAMA official records, 689 registered fireworks factories give direct employment opportunity to 33,462 women workers in Sivakasi alone. Stratified random sampling method has been adopted for the present study.

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Sample Factories</th>
<th>Total number of Women workers</th>
<th>Size of the Sample Women Workers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Nagpur Licence</td>
<td>20181</td>
<td>201</td>
</tr>
<tr>
<td>2.</td>
<td>DRO Licence</td>
<td>5413</td>
<td>54</td>
</tr>
<tr>
<td>3.</td>
<td>Chennai Licence</td>
<td>7868</td>
<td>78</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>33462</td>
<td>334</td>
</tr>
</tbody>
</table>

Source: 1.* Office Records, TANFAMA, Sivakasi.
2. Survey Data
1.8 OBJECTIVES OF THE STUDY

1) To study the socio-economic profile of the sample respondents working in fireworks factories in Sivakasi;

2) To estimate the wage payment of the sample respondents working in fireworks factories in Sivakasi;

3) To analyse the working environment of the sample respondents in the work area of the fireworks factories in Sivakasi;

4) To identify the welfare measures of the sample respondents from the employers to the workers;

5) To assess the impact of health hazards of the sample respondents in the study area;

6) To explore the expenditure pattern of the respondents in the study area and

7) To offer policy suggestions for the fireworks effluents and provide guidelines to improve their health status in the working environment.

1.9 HYPOTHESIS

- Ho: There is no association between type of work and type of health problems.

- Ho: There is no association between type of work and type of respiratory problems.

- Ho: There is no association between type of work and type of skin diseases.

- Ho: There is no association between educational status and type of treatment.
Ho: There is no association between type of private treatment and improvement status.
Ho: There is no association between Educational status and Willingness to take life long Medication.
Ho: There is no association between Overtime work and type of general health problems.
Ho: There is no association between type of private treatment and reason for choice of private treatment.

1.10 SOURCES OF DATA

An interview schedule was prepared in the light of comments, suggestions and additional information put forth by the Researcher’s supervisor. Then, the interview schedule was pre-tested with ten sample respondents to judge the word arrangement, format and the like. The interview schedule was again modified to incorporate all the pertinent questions in the schedule for the purpose of bringing it in the present form.

1.10.1 PRIMARY DATA

Researcher has used the interview schedule for collecting primary data from the fireworks factory women workers. A detailed interview schedule was designed for the factory women workers. The interview schedule contains pertinent questions regarding socio-economic conditions, wage payment, expenditure pattern of their family, details of other sources of income, details of
debt, nature of work carried out by them, any previous experience, welfare measures given by employees, details of Health care measures etc.

1.10.2 SECONDARY DATA

The broad profile of the study area in which the data have been collected from the concerned Government offices, Deputy Director Office for Health, District Statistical Office, Tamil Nadu, Economic Appraisal and Statistical Hand Book of Tamil Nadu have formed the sources of secondary data. Besides, relevant books, journals, websites and other studies relating to health and human development were used.

1.11 PERIOD OF THE STUDY

The research work covers the study period of two years from 2012-2014, which was the two financial years.

1.12 TOOLS OF ANALYSIS

The following tools are employed for the analysis and interpretation of statistical data.

1.12.1 Chi-Square \((\chi^2)\) Test

\(\chi^2\) test is used to find out whether two attributes are associated or not. In the present study \(\chi^2\) is applied for finding out the association between adoption of family planning and selected variables. In order to test whether or not the attributes are associated, the null hypothesis is taken as there is no association between the two attributes studies. The formula for \(\chi^2\) is,
\[ \chi^2 = \sum \frac{(O - E)^2}{E} \]

Where \( O \) refers to the observed frequency and \( E \) refers to the expected frequency. The expected frequency of any cell is calculated from the following equation:

\[ E = \frac{RT \times CT}{N} \]

Where,

- \( E \) = Expected frequency
- \( RT \) = The row total for the row containing the cell.
- \( CT \) = The column total for the column containing the cell and
- \( N \) = The total number of observations.

The calculated value of \( \chi^2 \) is compared with the table value of \( \chi^2 \) for \((c-1)(r-1)\) degrees of freedom at 5 per cent level of significant. If the calculated value of \( \chi^2 \) is less than the table value of \( \chi^2 \), the hypothesis is accepted. On the other hand if the calculated value of \( \chi^2 \) is more than the table value of \( \chi^2 \), the hypothesis is rejected.

1.12.2 Analysis of Variance

To study the impact of the Type of work done by the sample workers and the chemicals used by them is correlated with the analysis of variance has been used. For analyzing such a relationship ‘F’ test is used. The relevant ‘F’ ratio is given as,

\[
F = \frac{\text{Estimate of Population variance based on between sample variance (}S^21/)}{\text{Estimate of Population variance based on between sample variance (}S^22/)}
\]
1.12.3 Likert Scaling Technique

A method of ascribing quantitative value to qualitative data, to make it amenable to statistical analysis, a numerical value is assigned to each potential choice and a mean figure for all the responses is computed at the end of the evaluation or survey. Used mainly in training course evaluations and market surveys, Likert scales usually have five potential choices (strongly agree, agree, neutral, disagree, strongly disagree) but sometimes go up to ten or more. The final average score represents overall level of accomplishment or attitude towards the subject matter.

Administering the Scale

Each respondent is asked to rate each item on some response scale. For instance, they could rate each item on a 1-to-5 response scale where:

1. = strongly disagree
2. = disagree
3. = undecided
4. = agree
5. = strongly agree

Along with econometric/statistical tools, conventional tools such as Percentage Analysis, Bar diagram and Pie diagram are also used.
1.13 LIMITATIONS OF THE STUDY

The study is confined to Sivakasi taluk alone. The study focusses only on Health status of women workers in the study area. The data were collected through personal interview with the help of users recall method. Sufficient care was taken to exclude personal bias of the sample respondents. There are certain questions which were not directly answered by the sample respondents relating to personal health. However, the findings and suggestions of the research work will be useful for policy makers to strengthen the provision and promotion of health care in the study area.

1.14 SCHEME OF WORK

The present study is divided into seven chapters.

➢ The introductory chapter highlights the importance of health, women health in India, Women health status in Tamil Nadu, research problem, objectives, research design and limitations.

➢ The second chapter is devoted to review the earlier studies relating to health status of women in different work environment.

➢ The third chapter deals with the Methodology and profile of the study area.

➢ The forth chapter focusses on the socio-economic conditions and working environment of the sample respondents.

➢ The fifth chapter has been made to study the health problems of fireworks women workers in the study area.
The sixth chapter presents the analysis of health status among the sample respondents in the study area.

A brief summary and important findings emerging from the study along with the suggestions are presented in the concluding chapter.
REFERENCES


Websites

1. Read more: http://www.businessdictionary.com/definition/Likert-scale.html#ixzz3012ksh2B