CHAPTER-III.
General Plan of the Study

This study was aimed at determining the efficacy of ear protectors in relation to psychological test performance, physiological parameters and efficiency (production) and, therefore, it had to be inevitably a field study.

Site Selection:

The prerequisite for studying occupational exposure of workers to noise was to study the characteristics and level of noise prevalent in different industries. Visits were, therefore, made to a few industrial organizations, viz. a fertilizer plant, a transport workshop and a textile mill. The weaving shed of the textile mill was selected to be a suitable site following a few criterion.

Sample Selection:

The weavers (age 21 years to 40 years) were examined by the Ear, Nose and Throat (E.N.T.) specialists to identify persons with ears free from pathology and having good hearing (Appendix 2). They were subsequently subjected to general medical examination by the Occupational Medicine Division of the National Institute of Occupational Health, Ahmedabad, to select persons having normal health and neuro-muscular co-ordinations (Appendix 6). Thus, 175 weavers were ultimately available for the study. They were categorised in five groups, viz., I, II, III, IV & V, following stratified random
sampling technique for the purpose of the study

Selection of Psychological Tests:

In this part of the study, an attempt was made to select psychological tests that may be closely linked to the weaving operations, with a view to find out the efficacy of ear protectors in relation to psychological test performance, rather than identifying psychological tests for selection of weavers at the pre-employment stage.

Discussions were held with a few technical personnel of the weaving department to get theoretical acquaintance of the weaving operations. Subsequent observation was made over a period of three hours for a few weavers to find the frequency of occurrences of the operations, and those which occurred most frequently were included for further study. The time taken by the individual weaver for performing the selected operations were noted with a stop-watch for three hours a day, over five days (job performance). As the poplin fabric is simplest to weave amongst the cloth varieties, the study was restricted to the poplin only.

A few psychological tests viz., motor coordination, manual dexterity, finger dexterity, memory (forward and reverse) and mental control, were administered in the loom shed on the weavers for whom the time taken for weaving operations were noted (test performance). Correlations were computed between job performance and test performance to find
out if the psychological tests could identify the abilities required for weaving operations.

**Audiometry:**

The audiometric booth was manufactured by a commercial firm, New Delhi. The National Institute of Occupational Health, Ahmedabad, and the National Physical Laboratory, New Delhi, were consulted for the purpose. The booth was calibrated at four ambient noise levels, viz., 90 dBA, 90 dBA, 106 dBA and 114 dBA.

The weavers had occupational exposures to noise for a long period of time before this investigation was carried out. Hence, audiometry of the weaver was conducted in the booth to assess hearing loss that they might have suffered. Audiometry was also done at various periods of exposures to noise such as 4 hrs. and 8 hrs. of exposure to determine hearing threshold shifts. Audiometry of a control group of 80 sedentary workers, unexposed to occupational noise, was also carried out for comparison.

**Evaluation of Attenuation Characteristics of Ear Protectors:**

In the individual experiment, thresholds of hearing were determined with: (a) open ear and (b) the ear protectors in position, in the audiometric booth. Half of the subjects worked in the order open ear tone, with ear plugs, ear muffs, and ear plugs with ear muffs, and the other half worked exactly in the reverse order.
Two short Questionnaires were administered to the subjects to assess their attitude towards noise of the loom shed and the ear protectors.

**Psychological Test Performance, Physiological Parameters and Efficiency (Production):**

The subjects were divided into five groups so as to include them under five different conditions as below:

<table>
<thead>
<tr>
<th>Group</th>
<th>Type of Ear Protector used</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>No ear protector</td>
<td>RELATIVELY QUIET</td>
</tr>
<tr>
<td>II</td>
<td>No ear protector</td>
<td>NOISY LOOM SHED</td>
</tr>
<tr>
<td>III</td>
<td>Ear plugs</td>
<td>Same as Group-I</td>
</tr>
<tr>
<td>IV</td>
<td>Ear muff</td>
<td>Same as Group-II</td>
</tr>
<tr>
<td>V</td>
<td>Ear plugs in combination with ear muff</td>
<td>Same as Group-II</td>
</tr>
</tbody>
</table>

Group I was the control group against group II in respect of psychological test performance and physiological parameters.

*Fisher and Yates, (1948), random number table was used.*
Group II was the control group against the experimental groups III, IV & V for purpose of psychological test performance and physiological parameters.

Groups I and II were the control groups against groups III, IV and V in respect of efficiency (production).

Other Environmental Conditions:

Other environmental conditions, viz., dry bulb, wet bulb, air velocity and illumination, were also measured at suitable intervals to find out whether the physical conditions, believed to influence performance, were altered during the study period.

Laboratory Experiments:

i. Comparison of motor-manual performance in quiet and noisy conditions:

Motor manual performance of persons of sedentary habits were compared in quiet and noisy environments. A few psychological tests were administered and physiological parameters, such as pulse rate, oral temperature and blood pressure, were observed in general room condition (50 dBA) in the evenings for administrative conveniences. Factory noise was generated (100 dBA) in the laboratory by an oscillator and played through a set of speakers. The subjects were exposed to noise for 15 minutes and the psychological tests were readministered, while physiological parameters were observed during, and, and after exposure periods.
Maze learning experiment:

In order to find out the effects of noise on maze learning, a group of nine pairs* of pure inbred Swiss mice were exposed to a noise of 114 dBA for 15 minutes, for 7, 14 and 21 trials, one trial each day. The mice were killed subsequently to collect biological specimen for biochemical analysis. The mice were kept fasting for four hours prior to the experiment. Equal number of mice underwent the same experiment in a relatively quiet condition. The experiment was conducted after 1900 hrs. because of nocturnal habits of the mice and for administrative conveniences.

*A pair consists of one male and one female mice.