

<p style="text-align: center;">SUMMARY AND RECOMMENDATIONS</p>

Good lighting for studying is essential for visual comfort and effective performance of the task. Over the past years, it has been observed that little attention has been given to special lighting arrangement for students in residences of school going children in Bombay city. As the tasks which need closer vision increases in number and time duration for students, providing adequate lighting condition for studying in residences and school grows in importance. The present study was therefore undertaken to identify the existing lighting condition for study in schools and residences of school going children in Bombay city. Based on the existing conditions problems can be identified in relation to good & adequate lighting.

The Objectives of the present study are.

1. To find out the quality and quantity of lighting available in schools and residences.
2. To compare the quality and quantity of light available with standards set by Indian Standard Institution.
3. To study the incidence of eye defects among students in relation to situational variables like
 - a) Age

- b) Dietary pattern
 - c) Heredity and other factors
 - d) Time of study
 - e) Quantum of time spent on study
 - f) Quantity of light (lumens per square feet)
 - g) Work area and its relation to the source of light.
 - h) Quality of light
 - i) Study habits of child
4. To make the recommendation in light of the findings.

The hypothesis of study are:

- I There is a difference in the illumination levels for study purpose in residences and schools and the recommended levels of illumination by the Bureau of Indian standard.
 - a) There is a difference between illumination level for study purposes in residences of students of the municipal schools and the private schools
 - b) There is a difference between the illumination levels between the municipal and the private schools.
 - c) There is a difference between the illumination levels for study purposes in the natural light available for the municipal schools and the private schools.

II The incidence of eye defects varies amongst the municipal school and private school children.

a) The incidence of eye defects vary according to grade in which student studies

b) The incidences of eye defects vary according to dietary pattern of children.

c) The incidences of eye defects are related to hereditary factors.

d) The incidences of eye defects is related to the time of the study.

e) The incidences of eye defects vary according to quantum of studies in terms of hours of study.

f) The incidences of eye defects vary according to quantum of light available for study purpose.

Limitation of study were :

- 1) The study was limited to 20 schools (10 municipal & 10 private) situated between Colaba and Andheri in Bombay City.
- 2) To the municipal Schools situated in their own building
- 3) The study was limited to schools which were offering S.S.C.E. course.

- 4) Residence lighting condition of students studying in 3rd, 4th, 6th, 8th and 9th standards of the municipal and the private school

A preliminary investigation of one of each of municipal and the private school were studied by questionnaire and interview was undertaken to familiarize the author with the lighting situations in the schools and the residences of the school going children in Bombay City and also to obtain guide lines for structuring final interview schedule. The sample selected for this preliminary investigation consisted of 25 children from each schools. The responses obtained were analyzed and utilized along with other literature to develop the final instrument.

The final instrument was developed based on the objectives of study and consisted two separate schedules for schools and residential visits. In spite of being time consuming interview method was chosen for present study as to safeguard against non return and incomplete responses from school and students family, to establish rapport with respondents so that authentic data could be collected and to observe the situation carefully for further analysis of the data.

The schedule for schools consisted of various characteristics of schools like sizes of classroom, strength of class, table space allotted, the window area, number of classrooms, number of fixtures for classrooms, sessions, types of light used, medical check up facilities given, distance of first and last row of bench from blackboard, height of light fixtures and furniture.

The quantity of light on work area was measured by G.E.C. lux meter. The quantity of light was measured on bright sunny day, cloudy day and rainy day at different timings like morning and afternoon and with and without artificial light and then the average was computed.

Residential observation schedule consisted of questions regarding general information about the child and his family, nutritional status of child, time schedule of child, his achievement in study . Quality and quantity of light available, in the house and in the study area.

Selected samples were then informed about the purpose of study and time of home visit was fixed according to mutual convenience. Care was taken to see that visit time is their study time. Two visits per students were paid to get correct response.

The data was collected during the year 1985-86

A coding plan developed by Mathew in which scores were assigned to each response to assess the quantity and quality of lighting was used. The plan also included means of analysing the study practices of students in terms of duration of study time, type of lighting used, space available for studying, desk placement and location of the study area.

Frequency tabulation was done for the entire observation schedule. Variables were then grouped into 10 main variables out of which six were specifically variables of the quantity and quality of light in student study area. Correlation were computed at the computation center, Tata Institutes of Social Science Bombay to determine the interrelationship among the incidence of eye defect and other variables like Nutritional status, Heredity, Age and Sex of the learner, time of study, time spent on study,(Quantum of work) Quantity of light, quality of light, and posture.

Scales developed by Mathew was used to measure adequacy of lighting in terms of quality and quantity of lighting and other related condition for good lighting for study. The different items included in these scales were quantity of

light in terms of lumens per square feet, direct and reflected glare as well as glare by contrast, direction, distribution, and diffusion of light; reflectance of wall, ceiling, floor, reflectance from lamp itself, colour and texture of work surface, desk placement, desk size, study posture and type of light used for studying.

MAJOR FINDINGS OF THE STUDY ARE :

QUANTITY AND QUALITY OF LIGHT IN RESIDENCES

In general, the quantity of illumination was found to be far below the standards recommended by the Indian Standard Institution or the Illuminating Engineering Society of United States, The low-wattage lamp used contributed to the inadequacy. The quality of the lighting condition was not desirable for visual comfort. The brightness ratio was such as to create objectionable contrast in brightness between the task light and the general light when both were present. Most of the municipal school children studied in natural light and general lights only; only a few had a task light to supplement the general light in room. In case of the private school children 26% had task light and 25% had combination of task and general light both 7.20% of the municipal school children had no electricity in their houses so they studied only during day time and reading place allotted in the municipal gardens in Bombay city.

Direct glare constituted a major factor in poor quality of light for students. Scores for the qualitative components on direction, distribution and diffusion were low. The reflectance levels of the surfaces met the desirable standard but only because of an inadequate quantity of light

Scales developed to measure the adequacy of light showed that there was extreme inadequacy in the quantity and the quality of lighting conditions in these residences . The range of scores on overall adequacy of lighting conditions was

from 38 to 67 out of possible 100; the average score was 49.1%. The municipal school children had poorer lighting conditions than the students from private schools.

Study practices of students were determined to investigate study conditions related to lighting. Such study practices as regarding the place & the time students study, the space available for use, and the use of the available light by the students were considered to be important. About 80% of the students studied for one to two hours. Only 13.00 percent of students studied for three hours and 0.10% students studied for 4 hours or more. On an average students from private school spent more time on studies than the municipal school children.

Only general light was used for studying by 86% of the municipal school children compared to 65% of the private school children. Altogether there were 17% of children who used both general and task lighting. Although an ideal condition for study included both the types of lighting, the type of lamp used by the students created objectionable glare by contrast in brightness in the room.

The majority of children did not have desks. Specially designed study table to suit need of children were there only in four cases. Majority of children used dining table for study purpose.

None of the student in both the groups had room or study area for himself. The private school children had 1 to 4 people sharing room whereas the municipal school children had 2 to 9 people sharing a room. This depended on size of family and number of rooms in house.

There was a variation between the two groups as far as location of their study area. Only 4% of the total student studied in separate study rooms and they all belonged to the private school and high income groups. The majority of th

private school children either studied in bed rooms or in dining rooms. In comparison to that the municipal school children studied in multipurpose rooms, living room, kitchen and balcony. Nobody had separate study room only 3% used bed room, for study purpose.

The placement of the desk was evaluated in relation to its effect on the lighting of the visual field. About half of the students did not have specific desk placement and thus there was no response for placement. About 28% had desk placed against the wall, 25% had placed it against the window and 9% had placed it in the center of the room.

The majority of the students had light source above the table or behind them which is not an ideal situation are only 29% of students had ideally located light situation where light sources are placed on the left side of the person.

Lighting is the dominant element in study and has bearing on the posture and sight seeing. In this study, it was found that about 43% of the students studied on their tables and sit erect, 38% sit either on ground, bed or divan and 18% studied lying down on bed. Poor posture can be a result of not having an adequate place and furniture for study.

RELATIONSHIP BETWEEN VARIABLES

Correlation between 10 major variables were computed. In pooled within group a) Age, Nutrition, heredity, Quantity of Light and Posture correlated. Among the private school quantity and quality of light co-related negatively with incident of eye defect and Nutrition, Age and Heredity co-related positively. Among the municipal school children Age, Nutrition, Time of Study and Posture co-related positively. In all correlation quantity of light correlated negatively with postural position of students while studying. This finding

indicates that students choose bed or dinning table rather than sitting at table to study because of having the better availability of light at the selected locality.

The study indicated that existing residential lighting conditions for study were far from adequate in quantity and quality. A lack of awareness on the parts of school authority and parents shows need for instructional programme in this area.

It is generally found that in the present schools amount of learning activities which requires close vision are increasing in number and duration. Children spent most of their working hours in school and in their home work and light in such environment is very important factor as it has direct relation with the vision, motivation and achievement of children. Thus the other part of study was to find out lighting condition in schools.

General characteristics like classroom size, ceiling height, strength of class, table space, window area, number of fixtures, blackboard light,type of light, number of class room were same in both the groups. But the schools varied in quantity and quality of light available for the instructional purpose.

The municipal school had more window area than the private school. Besides window area sill height of municipal schools were 3 feet thus allowing more quantity of light at desk.

All the municipal schools had adequate quantity of light in the class rooms where as 50% of the private schools only had adequate light. Average Lumen per square feet was 24.08 in municipal school and 18.52 in the private schools.

Direct glare and reflected glare were found in all schools in some of the classrooms. This problem was mainly present in the classrooms facing west.

On an average 4% of the municipal children wear spectacles whereas 19% of the private schools children wear spectacles.

The number of children wearing spectacles increased as per age and grade. This may be due to the excessive demand of close vision required in the progressive grades.

The municipal schools were better in quality and quantity of light because their school building are specially built for that, whereas majority of the private schools do not using school buildings which are specially built for schooling. The authorities need to be aware of this need and see that school buildings should be specially designed for learning and instructional purposes.

To conclude we can say that there is significant differences in illumination level of residences and schools.

The incidence of eye defects significantly varies amongst the municipal and the private school children.

Age and dietary pattern show significant relationship to eye defects, but hereditary, quantum of work, time of study and quantum of light available are non significant as far as eye defects concerned.

Hypothesis I is accepted there is a significant difference between illumination level and recommendation by Bureau of Indian standard.

- a) 't' value is < 0.02 level thus we accept the hypothesis that there is significant difference in illumination level of residence of both the groups and the private school children had better illumination level than the municipal school children.

b) 't' value was computed to see the difference of significance between illumination level of the municipal and the private school which gave result at < 0.01 level thus the hypothesis is accepted that there is difference in illumination level of both the school. The municipal schools had better lighting condition than the private schools

II The incidence of eye defect ^{various} according to age, heredity, and dietary pattern thus the hypothesis II a, b and c are accepted. The other factors like time of study, time spent on study, quantum of work, quantity and quality of light are non significant as far as 't' values are considered so we can say that they do not effect incidence of eye defect and thus hypothesis to d, e, and f are rejected.

A number of studies can stem from present one.

- 1) lighting conditions in all areas of home
- 2) School lighting conditions covering more number of schools
- 3) Survey of eye defects of people according to age, occupation and educational level will be useful information in understanding the problem of people requiring to do close vision.
- 4) Lighting practices of various culture and income can be studied in detail to see the difference in value pattern and activity Pattern and emotional responses of people.
- 5) Light can be studied as element of design and how it effects line, form, colour, texture and total atmosphere of the room.