The mental ability among different nutritional status children of Orai city in Bundelkhand region

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Abstract—**The proper health of nation directly depends upon the health of children. Nutrition is the fundamental pillar of human life, health and development and plays an important role across the entire life span. The nutrition status of an individual is often the result of many interrelated factors. The present study was conducted on 300 children belonging to 10-12 years age group, studying in class V, VI and VII in Orai city of Uttar Pradesh, India. To compare the mental ability and nutritional status both genders were considered. Different methods of investigation like, anthropometic measurement, clinical examination, dietary pattern and some standardized psychological test were taken. From the study it was concluded that there is significance difference between the mental ability of children of different nutritional status. Also, there is a highly significant difference between the socio-economic status of children of different nutritional status children. Whereas, there is no significance difference between the mental ability of poor nutritional status boys and poor nutritional status girls was observed. However, significant effect of sex on mental ability of children of different nutritional status was noted. Similarly, there is no significance effect of sex on socio-economic status of children of different nutritional status. A correlation between mental ability and socio-economic status of children was also found.**

Index Terms— **Children, Mental ability, Nutritional status, Orai, Socio-economic staus**

I. INTRODUCTION

India's commitment towards children is evident from the constitutional provisions, including the directive principles of state policy. A number of policies have been adopted especially for children, and a host of welfare and development programmes have been launched. The Government has also enacted legislation to reaffirm its commitment to the causes of child survival, growth and development in all spheres of life. But still there is a lacuna between the demand and supply. The nutritional status of below 12 years is demanding fresh water, clean house and proper nutrition. The proper health of nation directly depends upon the health of children. Children are the greatest national resource as the future of the nation lies on their shoulders. They need to be nursed, nourished and equipped to be build healthy and strong so that they are able to build a superior nation and society. Nutrition is the fundamental pillar of human life and plays an important role in maintenance of positive health and development. Proper nutrition not only prevents diseases but also cures deficiencies viz., Vitamin A, Goiter and Protein deficiency etc. Nutrition (correct amount and balance of nutrient) is utilized to promote the highest level of physical and mental health throughout the entire of life cycle and is related to other sciences such as physiology, biochemistry and psychology. In recent year nutrition is the concerned of socio-economic development. The nutritional status is the condition of health of the individual as influenced by the utilization of the nutrients. It can be determined only by the correlation of information obtained through a careful medical and dietary history, a through physical examination, and appropriate investigations (Raul, 2000).

The nutritional status can be determined only by the correlation of information obtained through a careful medical and dietary history, a through physical examination, and appropriate investigations. The nutrition status of an individual is often the result of many interrelated factors. Characteristics of nutrition and health problems vary by country, in accordance to the different socio-economic setting and the various policies adopted. The impact of socio-economic policies and programs on the nutrition status of the population is a critical and vital aspect. Adequate food and access to health services are regarded usually as the main determinants for the nutrition status of the population. The Social-economic status is generally determined by

occupation, education, income of the family, land, property, residence quantity and quality of cloth, consumed and number of servants of the family and neighborhood and intelligence. The socio-economic indicators of consumption are characteristic of under developed economy in India. Under development also find expression through several socio-economic indicators, such as per capita intake of calories, fat and proteins, population per T.V. set and physician. Reschly (2009) and Stromme and Magnus (2000) studied about mild mental retardation (MMR) focusing on familial retardation in lower SES families. Several ways to epitomize the environment in which improvised children are raised were explored, including improved health care and nutrition, comprehensive with low-birth weight infants and preschool education. It is argued that important question is not how to cure MMR, but how to encourage those with in this category to use fully the intelligence they possess. It is true in the Indian context as well and it was observed that in the city of Orai (Jalaun district) in Uttar Pradesh mental ability of children of low socio-economic status and poor nutritional status was less as compare to those from high socio-economic status and good nutritional status. For understanding the effect of nature and nurture and nutritional importance, the present study on the mental ability among children of different nutritional status was conducted. The present study was designed to study the mental ability among different nutritional status children. The nutritional status of individual is often the result of many interrelated factors. The main two factors, which are responsible one is environmental factor and the other is heredity factor. As it is quite impossible to control the heredity, therefore focus on the other i.e. environmental factor was given.

II. MATERIAL AND METHODS

The present study was conducted on 300 children belonging to 10-12 years age group, studying in class V, VI and VII in Orai city of Uttar Pradesh, India. To compare the mental ability and nutritional status both genders were considered.

Sample approach:

As the purpose of the present study is to have a comparative study of the children of different nutritional status children were selected by purposive sampling technique.

Classification of children

Total number of children (300)			
Nutritional status	Good	Average	Poor
Number of students	100	100	100
Male	50	50	50
Female	50	50	50

Research design

As the present study is an exploratory nature in which the independent variable have already occurred and it starts with the observation of the dependent variable. Consequently an ex-post factor research design was considered for present study.

In the present research problem independent variables are –

• Nutritional status

• Sex (Male & Female)

• Socio-economic status

In the present research problem dependent variable is the 'mental ability'.

The Assessment of Nutrition Status

Assessment of nutritional status of children of 10-12 year of age was made by anthropometric measurement, clinical examination and dietary survey.

(1)*Anthropometric measurement*

The anthropometric measurements were record using standard techniques. Weights were recorded nearest 0.1 kg without footwear. Standing height was measured to nearest 0.5 cm. head, chest and mid arm (left) circumferences were measured using flexible not stretchable tape. Weight, height, head, chest and mid arm circumferences provide information about a child's physical growth.

(i)The measurement of weight –

The weight of the subject was taken with the standard weighing machine the subject stood at the centre of the weighing machine, The weight was recorded correct as quarter of a Kg.

Gomez Formula :

$$\text{Weight for age (\%)} = \frac{\text{Weight of the child}}{\text{Weight of a normal child of a same range}}$$

Between 90 and 110% = Good nutrition status

Between 80 and 89% = Average nutrition status

Under 80% = Poor malnutrition

(ii)The measurement of height
The standing height was taken with the subject standing without shoes against a marked scale on the wall and read on the scale. Height was recorded correct to the near centimeter.

(iii)Measurement of head circumferences
Measurement of head circumferences relates skill to nutritional status and indicates the brain size in subject. The head circumference was noted by keeping the children head in a steady position and placing the tape firmly round the frontal bone of the sub-level on all sides measurement was taken to the nearest of 0.5 mm.

(iv) Measurement of chest circumferences
The chest circumference was noted by keeping child in straight standing position without inhalation of air and placing the tape firmly around the chest measurement was taken nearest to 0.5 mm.

(v) The measurement of mid arm circumferences
Measurement of mid arm circumference was noted by keeping non-stretchable tape around middle of the left mid-arm of the child measurement was taken nearest to 0.5 mm.

Clinical Examination
To see the presence or absence of any of these signs a child is examined from head to toe in good illumination. To minimize subjective and objective errors in clinical examination, standard survey forms or schedules were prepared covering all areas of the body (Park, 1994).

Dietary Assessment
The value of nutritional assessment is greatly improved when it is supplemented by an organized study of good habits. The diet survey provides information about dietary intake and pattern, specific foods consumed and nutrient intake by the people and brings out relative dietary inadequacies as judged by the available standards (Park 1994).
To find out the food habits and dietary patterns of the children 24 hour recall method was conducted. The method adopted for diet survey was questionnaire. In this survey special attention was given to the quality and quantity of food taken. The 24 hour recall method was used which consist of asking their mother of 24 hour food list.

Collection of Data
In the present study, 300 sample were studied in which 100 were good nutritional status (50 male + 50 female), 100 were average nutritional status, 100 were poor nutritional status (50 male + 50 female). For data collection different locations of the Orai city were chosen. For the collection of data not only high and middle class areas but also lower class area of Orai city was visited. Door to door approach and interview with parents of these areas were approached one by one and the objectives of this study were explained. All parents co-operated with researcher for the all test as 'Assessment of Nutritional Status' and provided one day dietary information of their children. Two test namely 'Group test of Intelligence' by R.K.Tandon and 'Socio-Economic Status Scale' by S.D. Kapoor were administered on some selected children. Subjects were requested to answer the question sincerely and truthfully. Their parents were assured that the information and responses would be kept strictly confidential. Subjects were requested to answer the ability received by heredity factor and environmental component. The intelligent quotient is a gift of nature which is nurtured with the help of nutrition. The investigator tried to find out the relationship between mental ability and nutritional status, mental ability and socio-economic status and gender differentiation. In this research work the gender differentiation was also consider, as it is well known fact that after so much of advancement yet girls stood in second line after boys.After administrating the tools the response sheets of each subject were scored according to the instructions given for the scoring procedure. The marks and divisions obtained in the final examination were recorded from the result sheets of the children.

III. RESULTS AND DISCUSSION

The results have been analyzed and discussed based on the hypothesis put forward as follows:
HYPOTHESIS 1-*There is significance difference between the mental ability of children of different nutritional status.*
The results are highly significant and showing very positive relationship between mental ability of

children and their nutritional status. The children who have fallen in the category of mild and severe nutrition were found to have low mental ability. Generally the mental level of children is the result of heredity. The mental ability of parent and grandparents determine the level of mental ability in children but the given mental ability by the heredity is developed with the favorable environmental conditions. The nutrition taken by the children is one of the prominent factor which is responsible for proper development of mental ability. It is proved by many researches that development of brain cells directly related to the high protein diet which is in good quality also and it also concluded by many complicated chemical processes which are directly or indirectly affected by daily requirement of vitamin and minerals. Ivanovic, *et al*. (2004) have disclosed their opinion that there is an interrelationship between head circumference (HC) and intellectual quotient (IQ), learning, nutritional status and brain development in school-age children graduating from high school, of both sexes and with high and low IQ and socio-economic status (SES).

For better understanding of the subject, the first hypothesis was divided into the following sub-hypothesis :

Sub-hypothesis (i) *There is significant difference between the mental ability of poor nutritional status children and average nutritional status children.*

This hypothesis was proved as the result between poor nutritional status children and average nutritional status children differs highly significantly at 0.01 level. With reference to the table 1, it is evident that two nutritional status group differ significantly at 0.01 level in respect to their mental ability value. Mean score of average nutritional status children is higher than poor nutritional status children. The mean score of poor nutritional status children was 92.64 and average nutritional status children mean was 112.220, the S.D. value also showing difference in between them.

Table 1. Mean score and level of significance between poor and average types of nutritional status of children

Mental ability	Poor nutritional status of children	Average nutritional status of children	(t) value	Level of significance
Mean	92.640	112.220	7.405	0.01
S.D.	22.466	12.064		

Sub-hypothesis (ii) *There is significance difference between the mental ability of average nutritional status children and good nutritional status children.*

This hypothesis was proved as the result between average nutritional status children and good nutritional status children differ highly significantly at 0.01 level. The table 2 exhibits that mean score of mental ability differs according to their nutritional status group. The two nutritional status are highly significant at 0.01 level in respect of their mental ability value.

The mean score of average nutritional status children was 112.220 and good nutritional status children mean is 138.400. The S.D. value is also showing difference in between.

Table 2. Mean score and level of significance between average and good types of nutritional status of children

Mental ability	Average nutritional status of children	Good nutritional status of children	(t) value	Level of significance
Mean	112.220	138.400	13.391	0.01
S.D.	12.064	14.306		

Sub-hypothesis (iii) *There is significance difference between the mental ability of good nutritional status children and poor nutritional status children.*

This hypothesis was proved as the result between good nutritional status children and poor nutritional status children differs highly significantly at 0.01 level. Finding in the table 3 shows significant difference in two nutritional status for mental ability value. Good nutritional status children's mean score is higher than poor nutritional status children. The mean score of poor nutritional status children was 92.640 and good nutritional status children mean is 138.400. The S.D. value is also showing difference in between.

Table 3. Mean score and level of significance between good and poor nutritional status of Children

Mental ability	Good nutritional status of children	Poor nutritional status of children	(t) value	Level of significance
Mean	138.400	92.640	17.550	0.01
S.D.	14.306	22.466		

The above result shows that the mental ability of children is affected by nutritional status of children.

As the nutritional status of children is increase the mental ability of children is also positively changing. Reliability between mental ability and well nourishment of children was found to be satisfactory by Natesan and Devdas (1981). Similar observations on higher nutritive value supplement produce significant improvement in the mental ability of the preschool children were reported by Puri*et al.* (1984)

HYPOTHESIS 2- *There is significantly difference between the socio-economic status of children of different nutritional status.*

This hypothesis is further divided in the following sub-hypothesis –

Sub-hypothesis (i) *There is significant difference between the socio-economic status of poor and average nutritional status children.*

This hypothesis was proved as the result between poor and average nutritional status children differs highly significantly at 0.01 level. The table 4 exhibits that mean score of socio-economic status differ according to their nutritional status groups. The mean score of poor nutritional status children was 18.60 and average nutritional status mean is 41.91.

Table 4. Mean score and level of significance between poor and average nutritional status of children

Socio-economicstatus	Poornutritional status of children	Averagenutritional status of children	(t) value	Level of significance
Mean	18.600	41.910	15.691	0.01
S.D.	9.789	10.439		

Sub-hypothesis (ii) *There is significance difference between the socio-economic status of average and good nutritional status children.*

This hypothesis was proved as the result between average and good nutritional status children differ highly significantly at 0.01 level. Good nutritional status children's mean score is higher than average nutritional status children (table 5). The mean score of average nutritional status children was 41.91 and good nutritional status children mean is 47.07. The SD value is also showing the difference.

Table 5. Mean score and level of significance between average and good nutritional status of children

Socio-economi	Averagenutritional status	Goodnutritional	(t) value	Level of
c status	of children	status of children		signifi cance
Mean	41.910	47.070	4.177	0.01
S.D.	10.439	8.958		

Sub-hypothesis (iii) *There is significance difference between the socio-economic status of good and poor nutritional status children.*

This hypothesis was also proved as the result between good and poor nutritional status children differs highly significantly at 0.01 level. Table 6 exhibits that mean score of socio-economic status differ according to their nutritional status group. The mean score of poor nutritional status children was 18.60 and good nutritional status children mean is 47.07. The SD value is also showing difference between them.

Table 6. Mean score and level of significance between good and poor nutritional status of children

Socio-economic status	Good nutritional status of children	Poor nutritional status of children	(t) value	Level of significance
Mean	47.070	18.600	20.335	0.01
S.D.	8.958	9.789		

Malnutrition was highly prevalent among the poor communities in our country. The extent and severity of malnutrition, however, differed in various status and communities. Bhat*et al* (1997) studied the nutritional status of 584 preschool children in an urban slum of Srinagar and reported higher prevalence of malnutrition associated with higher age, female sex, lower per capital income, higher birth order and lower parental literacy. Eight cases of scurvy were reported in 1997 to 1998 in a hospital in Kolkata (Paul *et al.*, 1999) all of which were from illiterate and poor families (low SES families).

As we know that mental ability of children depends upon heredity of individual and grow with in the favorable environment. It is well known fact that if the child gets good nutrition during childhood is mental make-up is up to the mark. But it is also true that very low mental ability person cannot be treated by giving high nutritional diet. In first hypothesis it is already proved the relation between the mental ability of children and nutritional status.

HYPOTHESIS 3- *Is there any significant effect of sex on mental ability of children of different nutritional status children?*

Boys and girls both are individuals and get their mental ability according to their heredity but not due to their own sex but the environment they get after birth differs their mental ability as boys get more opportunity, favorable environment, good diet and post natal care. To get the answer to the question put forth, following sub-hypothesis were proposed:

Sub-hypothesis (i) *There is significant difference between the mental ability of poor nutritional status of boys and poor nutritional status of girls.*

This hypothesis was not proved as no significant differences was found.

Sub-hypothesis (ii) *The next sub-hypothesis deals with average nutritional status children boys and girls.*

The significant difference between their mental ability and nutritional status is significant at 0.05 level (table 7). This shows that less nutritional status though affects the mental ability of children but not very strongly. The children who are getting mild nutritional may be having high or average mental ability due to their heredity factor but there is no doubt that nutrition is an important factor to determine the mental ability of children.

Table 7. Level of significant of gender differentiation between average nutritional status of children

Mental ability	Average nutritional status of boys	Average nutritional status of girls	(t) value	Level of significance
Mean	115.26	109.18	2.59	0.05
S.D.	12.51	10.89		

Sub-hypothesis (iii) *There is significance difference between their mental ability and good nutritional status of boys and normal nutritional status of girls.*

The result from table 8 shows the significant difference between the mental ability and nutritional status of boys and girls at 0.05 level. This sub hypothesis also deals with the better environment conditions of boys.

Table 8. Level of significant of gender differentiation between good nutritional status of children

Mental ability	Good nutritional status of boys	Good nutritional status of girls	(t) value	Level of significance
Mean	141.94	134.86	2.54	0.05
S.D.	15.21	12.51		

Sub-hypothesis (iv) *There is significance difference between the mental ability of boys and girls.*

The results show that there is highly significant difference between the mental ability of boys and girls at 0.01 level (table 9). It is well known fact that there is every Indian culture girl stood in second line after boys. Boys are fed better and more properly look after as society nurture the boys to become stronger and the leading member of the group. Whereas girls are also looked after well but get little bit less preference over boys.

Table 9. Level of significance of gender differentiation

Mental ability	Boys	Girls	(t) value	Level of significance
Mean	117.41	111.43	3.378	0.01
S.D.	26.78	23.21		

Cueto *et al.* (2016) also indicated that urban student score higher then rural students, the highest score are scored by the student in urban private and parochial schools compared to state schools. Boys show significantly higher scores than girls in both urban and rural areas.

HYPOTHESIS 4- *There is no significance effect of sex on socio-economic status of children of different nutritional status.*

The results show that this hypothesis is not proved. It was found out that there is no significance effect of sex on socio-economic status of children of different nutritional status.

Co-relation studies between mental ability and socio economic status

Socio-economic status is one of the determining factors in many aspect of life as status of individuals states the social position as well as the economic condition of the family in which the child is reared. The child develops his concepts towards many things according to his or her socio-economic status. To know the effect of gender differentiation the total data was divided according to gender and tried to find out the relation between mental ability and socio-economic status in gender separately. On perusal of data presented in table 10, correlation is found between mental ability and socio-economic status of boys. The result shows that socio-economic status of boys and mental ability is showing high co-relation in between the mean score of boys mental ability is 117.41 and S.D. score of boys is 26.78. The boy's mean score of socio-economic status score is 36.14.

The correlation is between 0.636, which is showing that socio-economic status is related positively with mental ability of children.

Table 10. Correlation score between mental ability and socio-economic status of boys

	Mental ability boy's score	Socio-economic status boy's score
Mean	117.41	36.14
S.D.	26.78	15.55
Correlation	0.636	

Similarly, correlation was found between mental ability and socio-economic status of girls (table 11). In the score of girls found the co-relation is moderate co-relation the mean score of girl's mental ability is 111.43 and S.D. is 23.25. The socio-economic status score of girls is 35.58 and S.D. is 16.00. The co-relation between mental ability and socio-economic status girls are 0.538 which is moderate co-relate factor.

Table 11. Correlation score between mental ability and socio-economic status of girls

	Mental ability girl's score	Socio-economic status girl's score
Mean	111.43	35.58
S.D.	23.25	16.00
Correlation	0.538	

REFERENCES

[1] Bhat, IA, Amin, S and Shah, GN. 1997. Impact of socio-medical factors on pre-school malnutrition -an appraisal in an urban setting. Indian Journal of Maternity and Child Health, 8(1):5-8.

[2] Cueto, S., Miranda, A., León, J. and Vásqueze, M.C.2016. Education Trajectories: From Early Childhood to Early Adulthood in Peru Young Lives; p 52Paul DK, Lahiri M, Garai TB, Chatterjee MK. 1999. Scurvy persists in the current era. Indian Pediatr; 36:1067

[3] Ivanovic, DM, Leiva, BP, Pérez, HT, Olivares, MG, Díaz, NS, Urrutia, MS, Almagià, AF, Toro, TD, Miller, PT, Bosch, EO, Larraín, CG. 2004. Head size and intelligence, learning, nutritional status and brain development. Head, IQ, learning, nutrition and brain. Neuropsychologia, 42(8):1118-31. doi: 10.1016/j.neuropsy chologia .2003.11.022. PMID: 15093150.

[4] Natesan, H and Devdas, RP. 1981. Measurement of mental abilities of well nourished and malnourished children, Journal *of Psychological Researches,* 25(3) : 121-124.

[5] Park, K. 1994. Park's text book of preventive and social medicine. BanarsidasBhanot Publishers, Jabalpur, 437-439.

[6] Puri, R, Chawla, P, Sharma, M and Pershad, D. 1984. Impact of ongoing supplementary feeding programme on the mental abilities of children. Indian Journal of Pediatrics, 51(13): 653-657.

[7] Raul, J. 2000. Dictionary of Food And Nutrition. APH Publishing. New Delhi. P. 430

[8] Reschly, DJ. 2009. Documenting the Developmental Origins of Mild Mental Retardation, *Applied Neuropsychology*, 16:2, 124-134, DOI: 10.1080/09084280902864469

[9] Stromme, P and Magnus, P. 2000. Correlations between socioeconomic status, IQ and aetiology in mental retardation: A population-based study of Norwegian children. Social psychiatry and psychiatric epidemiology, 35 (1): 12-18. 10.1007/s001270050003.