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NUTRITIONAL STATUS AND ACADEMIC PERFORMANCE: A STUDY ON SCHOOL-AGED CHILDREN IN RURAL AREAS OF JAMMU & KASHMIR, INDIA

Om Raj Katoch

Assistant Professor
Department of Economics
Govt. Degree College Ramban, Jammu & Kashmir

Aroon Sharma

Associate Professor
Department of Economics
University of Jammu, Jammu & Kashmir

Abstract

Education is a basic human right and a significant factor in the development of children, communities, and countries. Malnutrition especially undernutrition is a major health problem affecting the academic performance of the children in many developing countries of the world. It continues to be the principal cause of ill-health and pre-mature mortality and morbidity among children.

Key words: Nutritional Status, Stunting, Wasting, Underweight, Academic Performance

Introduction

According to Wikipedia Encyclopedia, education in the general sense is any act or experience that has a formative effect on mind, character, or physical ability of an individual. In other words, "education is the process by which society deliberately transmits its accumulated knowledge, skills and values from one generation to another". Education plays an important role in creating innovations and meeting the growing needs of every nation. As per one of the study, the development of a nation is not measured through the buildings it has built, the roads it has laid down, bridges it has constructed but the human resources, the nation has developed through a well-defined system of education. For example, the level of education in the modern society has a powerful effect on economic growth, as individual earnings are systematically related to cognitive skills. It

further revealed that the developing countries lag dramatically behind developed countries in terms of development which may be due to the existence of the difference in the endowments of human resources (Eric A. Hanushek and Ludger Wobmann, 2007).

As per the Education For All (EFA) Global Monitoring Report (2005), education is a basic human right and a significant factor in the development of children, communities, and countries. Providing education to all children, especially girls will help to break the intergenerational chain of poverty, because education is intrinsically linked to all development goals, such as supporting gender empowerment, improving child health and maternal health, reducing hunger, fighting the spread of HIV and diseases of poverty, spurring economic growth, and building peace. The study further revealed that it is now well-established fact that the distribution of personal incomes in a society is strongly related to the amount of education people have, because more educated society may translate into higher rates of innovation, higher overall productivity and faster introduction of new technology. These relationships provide an extra reason for being concerned about the prevailing education system and its determinants.

Life expectancy is strongly and positively associated with education. For example, according to Organization of Economic Co-operation and Development (OECD) (2013), a 30 year old male tertiary graduate can expect to live another 51 years, while a 30 years male who has not completed upper secondary education can expect to live an additional 43 years. It further established that education can bring significant benefit to society, not only through higher employment opportunities and income but also via enhanced skills, improved social status and access to networks.

Research showed that healthy, well-nourished children are more interested and prepared to attend schools, always prepared to learn the things and earn higher grading points in the examination. For example, a research conducted by Naik S R et al. (2015) to investigate the relationship between nutritional status and academic achievement of Lumbani school children in the age group of 9-11 years. They assessed the nutritional status by using anthropometric measurements (height and weight) and the academic performance in terms of last examinations passed by the child. The study found that improved nutritional status of the children has a positive and direct impact on the academic performance of the children in the school. They argued that when children's basic nutritional and fitness needs are met, they

have the cognitive energy to learn and achieve higher grades in their academics. The study further established that increase in nutritional status increases the academic achievement of the children in the school.

Healthy and balance diet, improves brain capacity, maximizes cognitive capabilities, and improves academic performance in school-age children (Raush R, 2013, Katoch, 2012). There is a high relationship between the level of malnutrition and school achievements i.e. well-nourished children's performance is better in the school as compared to under-nourished children (Ghosh Santanu *et al.* 2013, Olaniyan R F *et al.* 2012).

Another study carried out by Sarma *et al.* (2013) to determine the effects of nutritional status on the educational performance of the primary school children in Nuwara Eliya, Sri Lanka. The nutritional status was determined in terms of stunting, underweight and thinness, and educational performance of the children was assessed by using end-term examination marks obtained in the schools. The study revealed that nutritional status is a very important element for determining the academic performance of children. It established that the children who were having underweight, stunting or any kind of undernutrition had a significantly low level of educational performance as compared to the normal children.

In this way, in summing up, the malnutrition is having a bad effect on learning due to increased infections, diminished cognitive and low school attendance rate (Anne Muiru *et al.* 2014). The early childhood malnutrition is likely to be a potential cause of delayed enrollment into the school, which led to the problem of coverage in grades of children (Christiana Buxton, 2011).

Significance of the Study

Nearly every nation has a serious health problem owing to malnutrition in one of its forms (Global Nutrition Report-2014). The assessment of growth in children is important for monitoring health status, identifying deviation from normality and determining the effectiveness of interventions (WHO-1995). The significance of timely detection of poor growth in early life resides in its association with adverse functional consequences, including poor cognition and educational performance, low adult wages, lost productivity and, when accompanied by excessive weight gain later in childhood increased the risk of nutrition-related chronic diseases (Victoria *et al.* 2008).

Undernutrition impairs children's mental development in the early years. A low height or weight for age is associated with impairment in developmental levels of young children (Matthew Jukes, 2006). Remarkable proportions of children and adolescents in underdeveloped and developing nations are suffering from undernutrition, often being unable to move out of undernourishment. Hunger and poor nourishment are often cited as a cause and effect of poverty. The reasoning for this is simple; people go hunger, if they do not have the means to acquire food. Lower food intake implies lower levels of energy, poor health as well as low productivity in the later stage of life (Batura Neha, 2013). This, in turn, means that individuals spend less time at school and work due to illness leading to losses in productivity with adverse consequences for the economic growth of a nation (Katoch & Sharma 2016). This is a major concern for the government worldwide for taking policy measures for the welfare of the children.

The school going children have high significance because this is the chief period of growth and nutrition of children and adolescent. The deficiencies of adequate nutrition in this age result in underweight, wasting, stunting, low immunity, impaired cognitive and motor development and low economic productivity in the later part of the life (Sudip Datta Banik and Sunita Chatterjee, 2010).

The improved nutrition status helps to break the intergenerational cycle of poverty, enhance labour force performance, income earning, and wage rate, generates broad-based economic growth, provides both a foundation for human development and the scaffolding needed to ensure it reaches its full potential and leads to a lot of positive consequences for individuals, families, communities, and countries. It means that improving the nutrition status of the children can have significant payoffs in terms of generating economic benefits and reducing costs. For example, a study conducted in Brazil in which a sample of more than 3000 individuals tracked over a period of thirty years found that infants who were breastfed longer than 12 months, achieved an additional year of education and higher incomes about three times higher than those with less than 1 month (UNICEF (2009). As per the Global Nutrition Report 2014, the scaling up nutrition specific intervention to address undernutrition has a benefit-cost ratio of 60.

There is surprisingly little research on the nutritional status of school going children as most of the studies had stressed on the pre-school children. Perhaps this research vacuum or lack of quantity of literature

reflects a need to investigate the relationship between nutritional status and academic performance of the school going children.

Using primary data from district Doda, Jammu & Kashmir, this study makes a modest attempt to answer the questions: Whether poor child nutritional status has an impact on the academic performance of the school going children or not?

Objective of the Study

To know the impact of nutritional status on academic performance of school going children in district Doda of Jammu & Kashmir, India.

To assess the nutritional status of 6-14 year old school going children and the association between child nutritional status and academic performance.

Material and Methods

The present study was conducted in district Doda of Jammu & Kashmir to assess the nutritional status of 360 school going children (6-14 years). Nutritional status of the children was assessed in terms of anthropometric measurement. Weight for age (WAZ), height for age (HAZ) and body mass for age (BMIZ) of the sample subjects were calculated and compared with WHO-2007 reference standard. The academic performance of the children was assessed by using marks or grades obtained in the last or the annual examination passed. Data were entered and analyzed using statistical software epi info 7 and Anthro Plus.

Questionnaire: The information regarding anthropometric characteristics of the children and their academic performance in the school was collected through a well designed questionnaire.

Anthropometric Measurement: The present study was based on Anthropometric Assessment which has become a practical tool for determining the nutritional status of children (*Hakeem, 2004*) and the well being of the children is indicated in a best way by the nutritional status globally (*Onis M de et. al 2000*). For measuring the height and weight of the children a stature meter (height measuring) tape and a weighing machine were used.

The z-scores system was used to determine the nutritional status of the children (stunting, wasting and underweight) following the internationally accepted cut-off points with reference to WHO 2007

standard. A child who is below minus two standard deviation (-2SD) from the median of a reference population in terms of height-for-age/ body mass index for age/weight for age was considered as stunted/ wasted/underweight.

Statistical Analysis

Data was entered and analyzed using statistical software *epi info 7 (available at www.cdc.gov).* Z-scores system was used to assess the nutritional status of the children by using software -WHO *Anthro Plus (version v1.0.4)* by comparing with WHO reference 2007. Statistical techniques were used to know the significance of nutritional status and academic performance of the school going children.

Results and Discussion

The mean weight of present studied boys and girls were also compared with Indian Council of Medical Research (ICMR) Table 1. It is evident that the present studied boys and girls have lighter weight and shorter stature than reference population (ICMR). It was observed that in the early ages the difference in the mean weight of children was less but after 12 year of age; it widened. The highest difference in mean weight was found 6.5 kg for boys of 14 year of age and 7.6 kg for girls in the same age group. Results further revealed that the mean height of boys and girls had increased with age. Lowest height 109.7 cm and 109.8 for boys and girls respectively were found for 6 year of age and highest height 152.3 cm and 150.4 cm for boys and girls respectively were found for 14 year age.

Results show that out of the total children screened (N=360), 21.11 percent were found stunted, 17.68 percent underweight and 9.44 percent were observed as wasted. The study further observed a low level of academic performance among stunted, wasted and underweight children as compared to the normal children.

Academic Performance

Academic performance is commonly measured by examinations or continuous assessment, but there is no general agreement on how it is used. Good T (2009) defines academic achievement as "the knowledge obtained or skills development in the school subjects usually designed by test scores or marks assigned by the teacher". The academic performance of the children can be assessed by using various indicators of performance, such as marks or grade obtained

Table 1: Mean Weights and Heights of Boys and Girls Participated in the Study

| Age in Years | N = 360 | | Mean Weight in Kg | | | | | | Meant Height in CM | | | | | |
| | | | Boys | | | Girls | | | Boys | | | Girls | | |
	M	F	ICMR	Present Study	Diff	ICMR	Present Study	Diff	ICMR	Present Study	Diff	ICMR	Present Study	Diff
6	20	20	20.7	17.5 ± 3.4	3.2	19.5	17.6 ± 2.4	1.9	116.1	109.8 ± 7.2	6.3	114.6	109.8 ± 6.4	4.8
7	16	16	22.9	20.5 ± 2.8	2.4	21.8	20.0 ± 2.1	1.8	121.7	117.4 ± 6.4	4.3	120.0	116.0 ± 5.9	4.0
8	28	28	25.3	22.3 ± 2.7	3.0	24.8	21.1 ± 3.5	3.7	127.0	122.9 ± 6.3	4.1	126.4	115.7 ± 20.2	10.7
9	32	32	28.1	26.1 ± 4.2	2.0	28.5	25.1 ± 4.8	3.4	132.2	131.0 ± 9.9	1.2	132.2	128.6 ± 8.8	3.6
10	35	35	31.4	28.5 ± 5.1	2.9	32.5	28.1 ± 6.7	4.4	137.5	134.4 ± 7.2	3.1	138.3	133.8 ± 7.3	4.5
11	11	11	32.2	29.0 ± 8.3	3.2	33.7	29.4 ± 7.6	4.3	140.0	134.9 ± 11.5	5.1	142.0	135.0 ± 10.1	7.0
12	14	14	37.0	31.5 ± 6.9	5.5	38.7	33.8 ± 4.5	4.9	147.0	144.3 ± 11.5	2.7	148.0	142.4 ± 6.0	5.6
13	12	12	40.9	38.4 ± 7.9	2.5	44.0	41.0 ± 11.4	3.0	153	151.5 ± 10.5	1.5	150.0	149.7 ± 5.8	0.3
14	8	8	47.0	40.5 ± 5.2	6.5	48.0	40.4 ± 6.4	7.6	160.0	152.3 ± 10.5	7.7	155.0	150.4 ± 6.2	4.6
Total	184	176												

Source: Survey Data, 2016, Values are given as mean ± SD

in the annual examination based on the curriculum (Sarma et al. 2013, Lee Y Y et al. 2014), marks obtained by the student in a test conducted by some agencies - universities, colleges, and recruiting boards etc for admission purposes (Ghosh Santanu et al. 2013) or providing employment (Neha Batura, 2013). Some of the studies also used years of schooling completed, annual placement rates and award received as the indicators for measuring the academic performance.

In the present study, the academic performance of the child was assessed by using marks or grades obtained in the last or the annual examination passed - marks obtained include the overall percentage of marks obtained in all the subjects. It was classified into four sub-categories on the basis of the scale of percentages of marks obtained in the last examination passed. The cut-off points used in the present study are shown in Table 2.

Table 2: Sub-categories and Cut-off Points

Sr. No	Cut-off Points	Sub-categories
1	≥ 75 percent	Excellent
2	60 – 74 percent	Very Good
3	45 – 59 percent	Good
4	33 – 44 percent	Average

Nutritional Status and Academic Performance

Results of the present study indicated that for all ages (6 - 14 years) and sexes, the prevalence of stunting (low height for age), wasting (low BMI for age) and underweight (low weight for age) were 21.11 percent, 9.44 percent and 17.68 percent respectively (Table 3). The analysis further show that female children were at higher risk of anthropometric failure in terms of all the three indicators (stunting, wasting and underweight) as compared to male children. These findings are also consistent with our earlier study (Katoch & Sharma, 2016).

According to the present study, the low level of academic performance in the school was among stunted, wasted and underweight children than the normal children. It was found that the excellent academic performance by stunted, wasted and underweight children was 7.89 percent, 5.88 percent, and 12.50 percent respectively, whereas these rates among normal children were 25.00 percent, 23.01 percent, and 24.50 percent respectively. The results were found statistically significant for stunting ($c^2 = 33.9311$, df=7, P<0.01), wasting ($c^2 = 33.4252$, df=7, P<0.01)

Table 3: Nutritional Status and Academic Performance

Nutritional Status	N=360	Academic Performance of the Children								χ^2
		Excellent		Very Good		Good		Average		
		Male	Female	Male	Female	Male	Female	Male	Female	
Height for Age	360									
Normal	284	71 (25.00)	58 (20.42)	44 (15.49)	51 (17.96)	33 (11.62)	25 (8.80)	1 (0.35)	1 (0.35)	c²= 33.9311
Stunted	76	6 (7.89)	4 (5.26)	17 (22.37)	19 (25.00)	12 (15.79)	15 (19.74)	0 (00)	3 (3.95)	P < 0.01
BMI for Age	360									
Normal	326	75 (23.01)	62 (19.02)	57 (17.48)	56 (17.18)	41 (12.58)	32 (9.82)	1 (0.31)	2 (0.61)	c²= 33.4252
Wasted	34	2 (5.88)	0 (0.00)	4 (11.76)	14 (41.18)	4 (11.76)	8 (23.53)	0 (0.00)	2 (5.88)	P < 0.01
Weight for Age	281									
Normal	249	61 (24.50)	43 (17.27)	41 (16.47)	44 (17.67)	37 (14.86)	21 (8.43)	1 (0.40)	1 (0.40)	c²= 21.5271
Underweight	32	4 (12.50)	2 (6.25)	3 (9.38)	10 (31.25)	3 (9.38)	9 (28.13)	0 (0.00)	1 (3.13)	P < 0.01

Source: Survey data, 2016, Values in parentheses are percentage

and underweight ($c^2 = 21.5271$, df=7, P<0.01). The findings of the present study are in agreement with the study conducted in Srilanka by Sarma et al. (2013) which established that all nutritional indicators (Height for Age, Weight for Age and Body Mass Index for Age) had significantly positive association with academic performance in the school.

Conclusion

In sum up, Undernutrition among children is increasingly recognized as a major prevalent and important public health problem in many developing countries including in India, which has a long-term consequences for the human and economic development (Bisai et al. 2008). The present study suggested that nutritional status of the children is a strong determinant of academic performance. As, it was found that all the anthropometric failure indicators (low height for age, low weight for age and low body mass index for age) had significantly positive association with low academic performance in the school.

There is a great need to focus the attention of the policy-makers for intervening in such areas, as nutritional status of children is a main indicator for determining the academic performance of the children in the school.

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