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Nutritional status and parental socio-economic conditions among the adolescent boys and girls of Sombaria village of West Sikkim, Northeast India

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KEYWORDS	ABSTRACT
Underweight, overweight, socioeconomic, lifestyle, adolescent	*Adolescence is a nutritionally vulnerable developmental stage. The nutritional requirements of the body during the adolescent stage increase tremendously due to rapid physical and mental growth. Poor nutritional status can make an individual susceptible to various health problems. The objective of the present study is to examine the nutritional status and its associated socio-economic factors among the adolescent boys and girls of Sombaria village, West Sikkim. Data was collected from 100 adolescent boys and 100 adolescent girls aged 12-19 years through random sampling method. The study shows the higher prevalence of underweight among the adolescent boys (42.00%) than adolescent girls (26.00%). The prevalence of overweight/obesity was higher among the adolescent girls (15.00%) than adolescent boys (8.00%). The higher frequency of overweight/obesity was found in the middle-income group among the adolescent boys (15.38%) and higher income group among the adolescent girls (17.39%). There is a significant association between various socio-economic conditions with the distribution of different BMI values. The factors influencing nutritional status must be identified and understood in order to develop the best strategies to eradicate the prevalence of underweight and overweight.*

Introduction

Adolescence is a nutritionally vulnerable developmental stage during which striking physical, cognitive and emotional growth takes place (Spear 2002). During the adolescent period, the nutritional requirements of the body increase tremendously due to rapid physical and mental growth (Silverstein et al. 2005). To attain sexual maturation along with proper growth and development, adolescents must intake an adequate amount of nutrients. Nutritional status is the physical expression of the relationship between the individual dietary intake, the bioavailability of ingested nutrients and his or her physical requirements (Brown 1984). When the body receives all the nutrients in appropriate amounts so as to meet the needs of the body, then the body is in the state of good health. On the other hand, lack or excess intake of one or more nutrients and fatal utilization of nutrients in the body leads to a state of imbalance in the body (Elia 2017). A report published by UNICEF shows that more than 50 percent of Indian adolescents in the age group of 10-19 years are thin, short, overweight or obese (FAO 2020). In developing countries and countries in nutrition transition, malnutrition is a major concern affecting a large number of school going children, influencing their health, growth and development (Chesire *et al*. 2008; Best *et al*. 2010).

A poor nutritional status makes an individual susceptible to various health problems. Many

developing countries face the double burden of malnutrition affecting their whole populations. Under nutrition in girls during the adolescent period increases the risk of various reproductive health issues (Santhya and Jejeebhoy 2015). On the other hand, over nutrition during adolescence increases the risk of various cardiovascular diseases (Dahm *et al*. 2016). Recent global studies show that although there has been a decline in the percentage of underweight, the percentage of overweight and obese has increased (Corsi et al. 2011). Various socio-demographic factors such as smoking habits, dietary habits, socio-economic conditions, education level have been recognized as modifying factors (Bray 1999).

The WHO recognizes adolescents as a neglected, difficult to measure population. Adolescents are the representative of the future generation and their nutritional status can reflect the future wellbeing of the society as a whole. But their nutritional status has received inadequate attention in research. Also in the Sikkim context, there is little information on the nutritional status of adolescents. Therefore, assessing the nutritional status of adolescents will help to understand the health prospect of the population as a whole. The habits acquired during adolescence have a profound impact on the future wellbeing of the individual. One crucial component of the healthy development of adolescent is good nutrition, which influences health, learning, physical fitness and ability to withstand stress and work at maximum productivity (Leslie 2004). Therefore, the present study was conducted to understand the nutritional status of adolescent boys and girls of Sombaria village of West Sikkim and the associated parents' socio-economic conditions.

Materials and methods

The present study was conducted in Sombaria village of West Sikkim, Northeast India. Sombaria is a small village located at a distance of 112 km from the capital city of Sikkim, Gangtok. Sombaria has mixed population of Limboo, Lepcha, Bhutia and other Nepali communities. Each community has their own distinct culture, tradition and beliefs. The economy of Sombaria is mostly based on agriculture, dairy and poultry farming. Cross-sectional data on 100 boys and 100 girls aged between 12 to 19 years were collected through the random sampling method. An Anthropometric rod and a weighing scale to the nearest 0.1cm and 0.5kg respectively was used to measure height and weight with subjects wearing light clothes following the standard technique of Lohman et al. (1998). Nutritional status has been evaluated using Asian cut-off points (WHO 2000). According to Asian cut-off points, BMI≥27.5 kg/m² has been considered as obese, BMI between 23.5-27.4 kg/m² considered as overweight, BMI between 18.5-23.4 kg/m² indicates normal and BMI below 18.5 kg/m² considered as underweight.

Data on various socio-economic conditions such as family income, house type, family type, parents' educational level, parents' occupations etc. were collected from each subject or head of the household. Parents' education was classified as illiterate, primary and secondary and above education. Mothers' occupation was divided as housewife and other occupations. Other occupations include government employees, self employed, business women etc. Fathers' occupation was divided as government employee, self employed and farmers. Family income was divided as high income group (above 75th percentile), middle income group (50-75th percentile) and low income group (below 50th percentile). Family type was classified as nuclear family and joint family. House type was divided as *pukka* house (cement and brick house) and *kuccha* house (mud and wood house).

The data were analyzed using MS-Excel software. The parameters taken were analyzed statistically to find out the mean and the standard deviation for the anthropometric measurements. Prevalence of underweight and overweight/obese was calculated in relation to different socio-economic conditions. In order to test the level of significance, t-test and chi-square test has been used in the present study.

Results

Table 1: Basic data on mean height, weight and BMI among adolescent boys and girls of Sombaria village

Sex	N	Mean height(cm) ±SD	Mean Weight(kg)±SD	Mean BMI ± SD	Underweight	Overweight/obese
Boys	100	156.78±10.98	48.14±12.21	19.28±3.00	42 (42.00%)	8 (8.00%)
Girls	100	150.01±6.64	46.4±8.87	20.50±3.14	26 (26.00%)	15 (15.00%)
		t=5.27;P<0.05	t=1.15;P>0.05	t=2.81;P<0.05		

Mean height was significantly (P<0.05) higher among the adolescent boys (156.78±10.98 cm) than the adolescent girls (150.01±6.64 cm) in the present study (table 1). Similarly, the mean weight was higher among the adolescent boys (48.14±12.21) than the adolescent girls (46.4±8.87). BMI was slightly higher among the adolescent girls (20.50±3.14) than the adolescent boys (19.28±3.00). The frequency of underweight was found higher among the adolescent boys (42.00%) than the adolescent girls (26.00%). However, the frequency of overweight/obese was higher among the adolescent girls (15.00 %) than the adolescent boys (8.00%).

Table 2: Distribution of different BMI values in relation with family income, house type and family type among adolescent boys and girls of Sombaria village

Income group	Boys sample	Underweight	Overweight/ obesity	Girls sample	Underweight	Overweight/ obesity
LIG	49	17 (34.69%)	1 (2.04%)	39	8 (20.51%)	6 (15.38%)
MIG	26	12 (46.15%)	4 (15.38%)	38	7 (18.42%)	5 (13.15%)
HIG	25	13 (52.00%)	3 (12.00%)	23	11 (47.82%)	4 (17.39%)
Family Type		χ2=9.16; P>0.05			χ2=8.71; P>0.05	
Nuclear	87	38(43.68%)	6 (6.89%)	78	21 (26.92%)	10 (12.82%)
Joint family	13	4 (30.77%)	2 (15.38%)	22	5 (22.72%)	5(22.31%)
House Type		χ2=2.11; P>0.05			χ2=4.43; P>0.05	
Pukka house	85	36 (42.35%)	7 (8.23%)	89	25 (28.08%)	15 (16.85%)
Kuccha house	15	6 (40.00%)	1 (6.66%)	11	1 (9.09%)	0 (00.00%)
		χ2=0.09; P>0.05			χ2= 5.34; P>0.05	

LIG-Low income group; MIG-Middle income group; HIG-High income group.

Table 2 shows the prevalence of underweight and overweight/obesity among adolescent boys and girls in relation to family income, family type and house type. Among the adolescent boys, underweight (52.00%) and overweight/obese (15.38%) was higher in the high income family and middle income family respectively. Among the adolescent girls, the frequency of both underweight (47.82%) and overweight/obese (17.39%) was found higher in the high income family. The frequency of underweight and overweight/obesity among the boys was found higher in nuclear family (43.68%) and joint family (15.38%) respectively. Similarly, among the adolescent girls, the frequency of underweight was higher in nuclear family (26.92%) and the overweight/obese was higher in joint family (22.31%). The higher frequency of underweight (42.35%) and overweight/obese (8.23%) was found among the boys who live in *pukka* house (cement and brick house). Again, the higher frequency of underweight (28.08%) and overweight/obese (16.85%) were found among the girls who live in *pukka* houses.

Table 3: Distribution of different BMI values in relation with parents' education among adolescent boys and girls of Sombaria village

Mother education	Boys sample	Underweight	Overweight/obesity	Girls sample	Underweight	Overweight/obesity
Illiterate	25	12 (48.00%)	1 (4.00%)	33	11(33.33%)	6 (18.18%)
Primary	27	6 (22.22%)	3 (11.11%)	20	3 (15.00%)	2 (10.00%)
Secondary and above	48	24 (50.00%)	4 (8.33%)	47	12 (25.53%)	7 (14.89%)
Father education		χ^2=6.48; P>0.05			χ^2=3.66; P>0.05	
Illiterate	20	8 (40.00%)	1 (5.00%)	21	6 (28.57%)	3 (14.28%)
Primary	29	10 (34.48%)	2 (6.89%)	24	4 (16.66%)	2 (8.33%)
Secondary and above	51	24 (47.05%)	5 (9.80%)	55	16 (29.09%)	10 (18.18%)
		χ^2=2.20; P>0.05			χ^2=3.56; P>0.05	

Table 3 shows the distribution of different BMI values among the adolescent boys and girls of Sombaria village in relation with parents' education. The frequency of underweight (50.00%) was higher among boys whose mother attained secondary and above education. This was followed by underweight among the adolescent boys whose mothers are illiterate (48.00%) and primary education (22.22%). The higher frequency of overweight/obese was found among the boys whose mother attained primary education (11.11%), followed by secondary education (8.33%) and illiterate (4.00%). The higher frequency of underweight (33.33%) and overweight/obese (18.18%) was found among the adolescent girls whose mothers are illiterate.

The higher frequency of underweight (47.05%) and overweight/obese (9.80%) was found among the boys whose father attained secondary and above level of education. Similarly, the higher frequency of both underweight (29.09%) and overweight/obese (18.18%) was found among the adolescent girls whose father attained secondary and above level of education. The frequency of overweight/obese was 14.28 percent and 8.33 percent among the girls whose fathers are illiterate and primary education respectively.

Table 4: Distribution of different BMI values in relation with parents' occupation among adolescent boys and girls of Sombaria village

Father occupation	Boys sample	Underweight	Overweight/ obesity	Girls sample	Underweight	Overweight/ obesity
Govt. employee	17	9 (52.94%)	1 (5.88%)	16	8 (50.00%)	2(12.5%)
Self employed	65	28 (43.07%)	6 (9.23%)	66	12 (18.18%)	9 (13.64%)
Farmers	18	5 (27.78%)	1 (5.55%)	18	6 (33.33%)	4 (22.22%)
Mother occupation		χ^2=3.05; P>0.05			χ^2=9.08; P>0.05	
Housewife	88	36 (40.90%)	7 (7.95%)	89	21(23.59%)	14 (15.73%)
Others	12	6 (50.00%)	1 (8.33%)	11	5 (45.45%)	1 (9.09%)
		χ^2=0.39; P>0.05			χ^2=2.47; P>0.05	

Table 4 shows that the higher frequency of underweight (52.94%) was found among the boys whose fathers are government employees. The frequency of underweight was 43.07 percent and 27.78 percent among the boys whose fathers are self-employed and farmers respectively. The higher frequency

of overweight/obese (9.23%) was found among the boys whose fathers are self-employed, followed by government employees (5.88%) and farmers (5.55%). Table further shows that the higher frequency of underweight (50.00%) was found among the girls whose fathers are government employees. The frequency of underweight was 33.33 percent and 18.18 percent among the girls whose fathers are farmers and self-employed respectively. The higher frequency of overweight/obese (22.22%) was found among the girls whose fathers are farmers. This was followed by overweight/obese among the girls whose fathers are self-employed (13.64%) and government employees (12.5%).

The higher frequency of both underweight (50.00%) and overweight/obese (8.33%) was found among the boys whose mothers are either government employees or self-employed. The frequency of underweight and overweight/obesity was 40.90 percent and 7.95 percent respectively among the boys whose mothers are housewife. Table further shows that the higher frequency of underweight (45.45%) was found among the girls whose mothers are either government employees or self-employed. However, the higher frequency of overweight/obesity (15.73%) was found among the girls whose mothers are housewives.

Discussion

The growth of children and adolescents is considered to be best suited for explaining the nutrition and health status of a community (WHO 1976). Malnutrition during adolescence can have long term consequences including delayed sexual maturation, loss of final adult height and obesity (Wahl 1999). The nutritional status of children not only affects health, but its profound impact is also evident in cognition and subsequently their educational attainment (Best *et al*. 2017). According to a recent research, the health and nutrition of the global adolescent population have been under researched in spite of its significant size (Querol *et al*. 2021). Under nutrition is most common in low income, developing countries like sub-Saharan Africa and Southern Asia where access to well-balanced diet is very limited (Cunningham 2015). Most specifically, almost two-thirds of the people that suffer from under nutrition are reported mainly from seven countries which include India, Bangladesh, Ethiopia, Indonesia, China, Pakistan and The Democratic Republic of Congo (Cunningham 2015). According to the National Family Health Survey-5 (2019-20) report, the prevalence of under nutrition is particularly common in the younger age groups in Sikkim. The present study also revealed a higher prevalence of under nutrition among the adolescents of Sombaria village of West Sikkim. The frequency of underweight was higher among the adolescent boys compared to the adolescent girls. However, the frequency of overweight/obesity was higher among the adolescent girls than boys in Sombaria village.

Children from low economic status families are very much associated with growth retardation and inadequate neurobehavioral development (Dipietro 2000). In the present study, the prevalence of underweight shows fluctuation among different income groups. Among the adolescent boys, the prevalence of overweight/obesity is found to be lower among the low income family. However, among the adolescent girls, the higher frequency of both underweight and overweight/obesity is reported from high income group. A study conducted by Noh *et al*. (2014) among Korean children revealed that underweight slightly increased at lower levels of parental economic status. Another study in Central India by Gupta *et al*. (2015) showed that the wealth quintile of household does not have direct association with underweight, stunting and wasting of children.

Studies have shown that in nuclear and extended families, the intake of nutrients was higher than those in joint families (Zia-ud-Din 2003). However, the present study revealed that the frequency of underweight is higher in nuclear families and overweight/obese is higher in joint families in both boys and girls. This finding is consistent with the findings of Shrestha *et al*. (2020), which stated that the

family size was not associated with underweight, stunting and wasting of children. Often the house type is taken as one indicator of economic status of a household. The higher prevalence of overweight/obesity was reported among boys and girls living in *pukka* houses (cement and brick house) in the present study.

Education is considered as a key element in the overall strategy to reduce malnutrition in the developing countries (Caldwell 1980). Knowledge and awareness of good nutrition and health of educated parents have profound impact on health outcome of their children. Kassauf and Senauer (1996) shows that the prevalence of malnutrition was more widespread among the children whose parents had little and no education. The report of National Family Health Survey-2 (1999-20) states that children whose mothers are illiterate are more likely to be malnourished. A study conducted by Kunwar and Pillai (2002) among children aged between 5 to 15 years found that there was a direct relationship between the levels of education and the nutritional status of children. In the present study, the higher frequency of both underweight and overweight are found among those whose fathers had attained secondary and above level of education.

The occupation of the parents has a direct impact on the quality of life in a household. In the present study, the higher prevalence of underweight was found among the boys and girls whose fathers are government employees. Similarly, the higher prevalence of underweight was found among the boys and girls whose mothers are either government employees or self-employed. Overweight/obese was higher among the girls whose fathers are farmers and mothers are housewives. However, overweight/obese was higher among the adolescent boys whose fathers are self-employed and mothers are either government employees or self-employed. A study by Nakahara *et al*. (2006) revealed that almost 77% of children of non-working mothers had normal nutritional status. Mothers who are government employees or self employed gets less time to look after their children compared to other women who usually stay at home and devote their time taking care of family members. Another study conducted in Punjab by Kaur *et al*. (2017) also showed that the children of all the non-working mothers had normal nutritional status. As a result, children of home maker mothers were less likely to be stunted than the children of those mothers who were engaged in other occupations (Shrestha *et al*. 2020).

Conclusion

The present study revealed that both underweight and overweight/obesity coexisted among the adolescent boys and girls of Sombaria village of West Sikkim, Northeast India. However, the prevalence of underweight was higher in both boys and girls. Being developmental phase of life, malnutrition during adolescent may have lifelong consequences. Further study on lifestyle factors and dietary habits to examine their relationship with nutritional status of the adolescent is needed to understand the prevailing malnutrition problems.

References

Best, C., Neufingerl, N., Van Geel, L., van den Briel, T., Osendarp, S. (2010). "The nutritional status of school-aged children: why should we care?". *Food and nutrition bulletin* 31(3):400-417.

Bray, G.A. (1999). "Nutrition and obesity: prevention and treatment". *Nutrition, metabolism and cardiovascular diseases* 9(4):21-32.

Brown, L.A.S., Bliss, A.S., Longmore, W.J. (1984). "Effect of nutritional status on the lung surfactant system: food deprivation and caloric restriction". *Experimental lung research* 6(2):133-147.

Caldwell, J.C. (1980). "Mass education as a determinant of the timing of fertility decline". *Population and development review* 225-255.

Chesire, E.J., Orago, A.S., Oteba, L.P., Echoka, E. (2008). "Determinants of under nutrition among school age children in a Nairobi peri-urban slum". *East African medical journal* 85(10):471-479.

Corsi, D.J., Subramanyam, M.A., Subramanian, S.V. (2011). "Commentary: measuring nutritional status of children". *International journal of epidemiology* 40(4):1030-1036.

Cunningham, K., Ruel, M., Ferguson, E., Uauy, R. (2015). "Women›s empowerment and child nutritional status in South Asia: a synthesis of the literature". *Maternal and child nutrition* 11(1):1-19.

Dahm, C.C., Chomistek, A.K., Jakobsen, M.U., Mukamal, K.J., Eliassen, A.H., Sesso, H.D., Chiuve, S.E. (2016). "Adolescent diet quality and cardiovascular disease risk factors and incident cardiovascular disease in middle-aged women" *Journal of the American Heart Association* 5(12).

DiPietro, J.A. (2000). "Baby and the brain: Advances in child development". *Annual Review of Public Health* 21(1):455-471.

Elia, M. (2017). "Defining, recognizing, and reporting malnutrition". *The international journal of lower extremity wounds* 16(4):230-237.

FAO. (2020). "*The State of Food Security and Nutrition in the World 2020. Transforming food systems for affordable healthy diets*". Rome, FAO.

Gupta, M., Borle, A., Chhari, N., Gupta, S. (2015). "Nutritional status assessment using WHO z-scores (BMI for age) in children aged 6-15 years–a study from Central India". *National Journal of Community Medicine* 6(1):92-97.

Kassouf, A.L., Senauer, B. (1996). "Direct and Indirect effects of parental education on Malnutrition of children in Brazil". *The University of Chicago Press Journals* 44:4.

Kaur, R., Mathew, S., Kaur, M. (2017). "A comparative study to assess nutritional assessment of working and non working parents having children 0-3 years of age at selected area, Ludhiana, Punjab". *Clinical Practice* 14(3):184-196.

Kunwar, R., Pillai, P.B. (2002). "Impact of education of parents on nutritional status of primary school children". *Medical Journal of Armed Forces India* 58(1):38-43.

Leslie, K.E. (2004). "Interactive Learning Exchange: Exploring Strategies to Reach and Work with Adolescents". *HNP discussion paper series,* World Bank: Washington DC.

Lohman, T.G., Roche, A.F., Martorell, R. (1998). "Anthropometric standardization reference manual". Chicago: Human Kinetics Books.

Nakahara, S., Poudel, K.C., Lopchan, M., Ichikawa, M., Poudel-Tandukar, K., Jimba, M., Wakai, S. (2006). "Availability of childcare support and nutritional status of children of non-working and working mothers in urban Nepal". *American Journal of Human Biology* 18(2):169-181.

NFHS-2. (1998-99). "National Family Health Survey". International Institute of Population Science:India.

NFHS-5. (2019-20). "National Family Health Survey". International Institute of Population Science: India.

Noh, J.W., Kim, Y.E., Oh, I.H. (2014). "Influences of socioeconomic factors on childhood and adolescent overweight by gender in Korea: cross-sectional analysis of nationally representative sample". *BMC Public Health* 14:324.

Querol, S.E., Iqbal, R., Kudrna, L., Al-Khudairy, L., Gill, P. (2021). "The double burden of malnutrition and associated factors among South Asian adolescents: findings from the global school-based student health survey". *Nutrients* 13(8):2867.

Santhya, K.G., Jejeebhoy, S.J. (2015). "Sexual and reproductive health and rights of adolescent girls: Evidence from low-and middle-income countries". *Global public health* 10(2):189-221.

Shrestha, A., Bhusal, C.K., Shrestha, B., Bhattarai, K.D. (2020). "Nutritional status of children and its associated factors in selected earthquake-affected VDCs of Gorkha district, Nepal". *International Journal of Pediatrics*.

Silverstein, J., Klingensmith, G., Copeland, K., Plotnick, L., Kaufman, F., Laffel, L., Clark, N. (2005). "Care of children and adolescents with type 1 diabetes: a statement of the American Diabetes Association". *Diabetes care* 28(1):186-212.

Spear, B.A. (2002). "Adolescent growth and development". *Journal of the American Dietetic Association* 102(3):S23-S29.

Wahl, R. (1999). "Nutrition in the adolescent". *Pediatric Annals* 28(2):107-111.

World Health Organization. (1976). "Health needs of adolescents: report of a WHO expert committee". Geneva.

World Health Organization. (2000). "International association for the study and International obesity task force, the Asian Pacific perspective: Redefining obesity and its treatment". Geneva.

Zia-ud-Din, P.I.P. (2003). "Assessment of nutritional status of adolescent boys from public and private schools of Peshawar, Pakistan". *Journal of Medical Research* 42(3).