



## **ROLE OF FAMILY INCOME ON HEALTH AND NUTRITION IN ADOLESCENT GIRLS OF RANCHI TOWN OF JHARKHAND**

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*This paper is an attempt to analyse the role of family income in enhancing the status of health and nutrition in adolescent girls in Ranchi town. Adolescence is an important stage of growth and development in the lifespan. Unique changes that occur in an individual during this period are accompanied by progressive achievement of biological maturity. This period is very crucial since these are the formative years in the life of a child when major physical, psychological and behavioural changes take place. Adolescent may represent a window of opportunity to prepare nutritionally for a healthy adult life. According to National Family Health Survey (NFHS-4), 19.5% of Indian population comprises of adolescent. India has 120 million adolescent girls, accounting for nearly 10% of the country's population (UNFPA-INDIA-2018). The health and nutritional status of adolescent girls is of prime importance, as they the future mothers. Healthy women can play multiple roles like generating income, ensuring their families' nutrition, having healthy children and also help in enhancing the countries' socioeconomic development. With the help of a pre-framed schedule primary data collected from 200 sampled adolescent girls of Ranchi town, the study concludes that there is statistically significant association between family income and status of health and nutrition of adolescent girls. The health and nutritional status of adolescent girls in the study area may be improved with increase in the employment opportunities and income of their parents.*

**Keywords:** Adolescence, Nutritional Index, BMI, Family Income.

### **INTRODUCTION**

WHO defines 'Adolescents' as individuals in the age group of 10-19 years. Adolescence can be the second opportunity to catch up growth if environmental conditions, especially in terms of nutrient intake, are favourable (Gopalan, 1989). Out of 1.2 billion adolescents aged 10 to 19 years worldwide, 243 million or about 20% live in India (United Nations, 2010). According to National Family Health Survey (NFHS-4), 19.5% of Indian population comprises of adolescent. India has 120 million adolescent girls, accounting for nearly 10% of the country's population (UNFPA-INDIA-2018). This huge number and poor status of health and nutrition of adolescent girls cannot be ignored. Adolescents are not a homogenous population; they are different by gender, caste, social groups and religions. They exist in a variety of circumstances and have diverse needs. The transition from childhood to adulthood involves dramatic physical, sexual, psychological and social developmental changes, all taking place at the same time. In addition to opportunities for development this transition poses risks to their health and well being of the numerous concern regarding adolescent girls, the gravest is of their health and nutrition status. Recent studies also focus on the identification of its determinants so that policy measures may be accordingly designed.

The urban slum adolescent girl faces greater mental challenges due to ever increasing pressure of modernisation and competitiveness they are exposed to. Their physical and mental activities are higher compared to their rural counterparts. It is therefore imperative to study the health and nutrition status of adolescent girls in urban areas and examine the role played by family income in it.

Poor nutrition starts before birth, and generally continues into adolescence and adult life and can span generations. Chronically malnourished girls are more likely to remain undernourished during adolescence and adulthood, and when pregnant, are more likely to deliver low birth-weight babies. Epidemiological evidence from both developing and industrialized countries now suggests a link between foetal under-nutrition and increased risk of various adult chronic diseases (ACC/SCN, 2000). Nutrition challenges continue throughout the life cycle, particularly for girls and women.

From a detailed review of available literature, it has been found that numerous factors influence food choices of adolescent. These may be grouped into categories. The first include appeal for food, craze for trendy foods, mood, body image, habit, media and association of food of people, convenience, preferences for outside food and peer influence. The second category covers socio-demographic family traits like parental influence on eating behaviour, culture, religion, beliefs and factors like family income, location, access to food, family occupation, level of education of parents, especially mothers and occupation of family (WHO, 2012).

The main focus of this study is to examine the role of family income in determining the health and nutrition of adolescent girls in the study area.

## **LITERATURE REVIEW**

There is immense literature on Health and Nutritional status. It is subject of concern at household levels, organisations, govt of state and national govt. And international bodies because it has been accepted that proper nutrition is important for healthy citizens of any country, who are its human resources. Several studies have been carried out by researchers to find the role of family income on status of health and nutrition in adolescents in India. The present study includes a review of available literature on role of family income in health and nutrition in adolescent.

National Nutrition Monitoring Bureau (NNMB 1981), showed that the height, weight and growth rates of adolescents of low income group, were about 70-80% of those of well-to-do adolescents.

Recent studies indicate that the association between low income and poor health has its origins in early childhood. (Case and colleagues, 2002) documented an inverse relationship between family income and health status among toddlers, and found that the income gradient in health became steeper with age. They also found that chronic conditions play a crucial role in the income gradient, and that high family income buffers children from the adverse health impact of chronic conditions. Parents' ability to manage successfully their children's' chronic conditions is positively related to family income (Thompson, Auslander, White 2001; Snodgrass et al. 2001).

The association between low income, on one hand, and reduced access to health care and worse health, on the other, represents just one manifestation of the effect of socioeconomic status on the life chances of adolescents. The main settings that influences the way children and adolescents grow up include families, neighbourhoods, and schools. The quality of these settings, and whether they are supportive and nurturing or dangerous and destructive, has a profound influence on adolescents' chances for leading successful adult lives. Family income is perhaps the single most important factor in determining the quality of these settings (National Research Council 1995).

Low family income has been associated with early sexual activity, cigarette smoking, adolescent

pregnancy, and delinquency (National Research Council 1995; Blum et al. 2000). Family income also affects the quality of the neighbourhoods in which children and adolescents grow up. Compared with low-poverty neighbourhoods, high-poverty neighbourhoods have lower availability of high-quality public and private services such as parks, child care centres and preschools, community centres, and health care providers, as well as fewer social supports and less effective social networks (McLoyd 1998). Conversely, high-poverty neighbourhoods are more likely to be physically deteriorated and to have more crime and street violence, greater availability of illegal drugs, and more negative peer influences and adult role models (McLoyd 1998; National Research Council 1995). These characteristics of high-poverty neighbourhoods may have deleterious consequences for the cognitive functioning, socialization, physical health, emotional functioning, and academic achievement of children and adolescents (Ellen and Turner 1997). The cumulative effect of socioeconomic status on families, neighbourhoods, schools, and health care guarantees that poor and low-income adolescents arrive at young adulthood in worse health, engaging in riskier and more dangerous behaviours, and with lower educational attainment and more limited career prospects than their more affluent counterparts. The repercussions of low socioeconomic status in childhood and adolescence are often felt throughout the life cycle.

Low family income during childhood not only had a cumulative effect over time, but living in the poorest income quintile specifically during early childhood had a lasting effect on adolescent SWB. Although no previous longitudinal study examined the effect of family income on youth positive mental health, studies on mental disorders support our findings (Reiss, 2013). A cumulative effect of low family income on poor adolescent mental health has been shown for depression (Najman et al, 2010 and McLeod JD, 1993), anxiety (Najman et al, 2010 ) antisocial behaviours (McLeod JD, 1993).

Studies have documented the adverse effects that poor socioeconomic circumstances (SECs) and low income have on health and mortality across the life course (Keating DP, 1999; Blane D, 1999; and Yen IH, 1999). In particular, evidence suggests that the experience of socioeconomic disadvantage and poverty in childhood is associated with impaired development and poorer health status in childhood (Aber JL, 1997; Bradshaw J, 2001; Brooks-Gunn J, 1997; Spencer NJ, 2000; Bradley RH, 2001 and Newacheck PW, 2003) and increased mortality and morbidity in adulthood (Galobardes B, 2004 )

Family income also has a profound influence on the educational opportunities available to adolescents and on their chances of educational success. Due to residential stratification and segregation, low-income students usually attend schools with lower funding levels, which result in reduced availability of textbooks and other instructional materials, laboratory equipment, library books, and other educational resources; low-level curricula; and less-qualified teachers and administrators (Kozol 1991; Oakes 1990 and Ingersoll 1999). The effects of concentrated poverty in schools may include disciplinary problems and chaotic learning environments.

Low-income adolescents have reduced achievement motivation and much higher risk of educational failure (Schultz 1993). In particular, compared with their more affluent counterparts, low-income adolescents receive lower grades, earn lower scores on standardized tests, and are much more likely to drop out of high school (Kao, Tienda, and Schneider 1996).

Family income is another aspect of family background that influences the career development of youth, especially for girls. One reason for this may be that families with limited economic resources tend to direct them first to the males of the family, giving less hope and encouragement for further education to the daughters in the family. Also, some parents, especially working class or lower-income parents--may hold values that place girls in the homemaker role and reflect less emphasis on occupational preparation (ibid.). Given this disposition, it is understandable that the self-efficacy of girls with respect to career opportunities is linked to the economic support they can expect to receive from their parents.

Thus, it has been established that family income affects health of adolescent girls in many ways. Low income reduced access to health care and make worse health. Family income also affects the quality of the neighbourhoods in which children and adolescents grow up.

### **Objectives of the Study**

The study aims to examine the health and nutritional status of adolescent girls in the study area and their association with family income.

And in view of this objective the following hypotheses are formulated

- There is no association between family income and nutritional status (measured by nutritional index) of adolescent girls of Ranchi Town.
- There is no association between family income and health status as measured by BMI of adolescent girls in Ranchi town

### **DATA & METHODOLOGY**

The study is based on primary data collected from 200 adolescent girls selected by proportionate stratified random sampling technique in Ranchi town, the capital of Jharkhand. Out of total of 53 wards 6 wards (3 tribal dominated wards- comprising of ward no. 3, 4 and 5 & 3 from non-tribal dominated wards- comprising of ward no. 19, 24 and 25) were randomly selected. As the period of adolescence covering 10 to 19 years is marked by two distinct stages (pre puberty period and post puberty period), the sample has been accordingly selected to cover Pre-puberty period (10 to 12 years) and Post puberty period (13 to 19 years). The study covered 68 adolescent girls of pre-puberty period and 132 of post-puberty period.

Data for study has been collected through pre-framed schedule which collects information on nutritional status and health status together with the socio-demographic traits. Nutritional index has been computed for each respondent as the ratio of reported average daily food intake of past week by recall method and the required intake as suggested by Nutrition expert group I.C.M.R. Of the various categories of dietary recommendations, the balanced diet (gm) at moderate cost for school going urban children was found to be most suitable in the study, hence selected for Recommended Dietary Allowance (RDA). Of the various food plans, the 10 food plan comprising cereals, pulses, green leafy vegetables, other vegetables, milk, fat and oils, meat/fish/egg, sugar/Jaggery and peanuts was used it is as most suited diet in urban areas of social groups. The following table shows the balanced diet (per day required consumption in grams) in adolescents.



**Table 1: Balanced Diet (gm) at Moderate Cost for School Children and Adolescents**

Foodstuffs	School Children				Adolescent Girls	
	10-12 years	13-15 years			16-18 years	
	V*	NV**	V*	NV**	V*	NV**
Cereals	290	290	400	400	320	320
Pulses	70	60	70	50	70	50
Green Leafy Vegetables	100	100	100	100	150	150
Other Vegetables (roots & Tubers)	75	75	150	150	150	150
Fruits	100	100	100	100	100	100
Milk	600	400	600	400	600	400
Fat & Oils	30	30	30	30	30	30
Mean, Fish and eggs	---	60	---	80	---	80
Sugar & Jiggery	30	30	30	30	30	30
Peanut	40	30	40	30	50	30

Source- Handbook of Food and Nutrition, Swaminathan, M. S., (2010)

V\*=Vegetarian,

NV\*\*=Non-vegetarian

The nutrition indices have been classified into three categories - Low (0.25 - 0.5), Medium (0.5 - 0.75) and High (< 0.75). For studying differences in health status of adolescent girls by different level of family income, the standard criteria of BMI, based on anthropometric method has been computed for each sampled adolescent girls. Using standard reference table of WHO (2007) they have been classified as Severe Thinness (<-3SD), Thinness (<-2SD), Normal (>-2SD and <+1SD), Overweight (>+1SD but <+2SD), Obesity (>+2SD). However the present study combines severe thinness & thinness in one group and overweight & obese in another group as no. of adolescent girls in these groups is less. Finally BMI has grouped into three categories namely 1) Severe Thinness & Thinness 2.) Normal and, 3.) Overweight & Obese.

The study focuses on computing the nutritional status and health status of adolescent girls in Ranchi town. It also attempts to establish the relationship between nutritional status as well as health status of adolescent girls according to income of the family. In this study income of the family has been categorized into five ranges; 0-15000, 15000-30000, 30000-45000, and above 45000.

Data obtained on health and nutrition status from each sampled girl have been averaged and have been tabulated across different income groups. After classification and tabulation of data descriptive (%), coefficient of correlation, scattered diagram) as well as inferential techniques (t-test at 5 % level of significance, chi-square) has been used to analyse the data. Then null hypothesis has been tested.

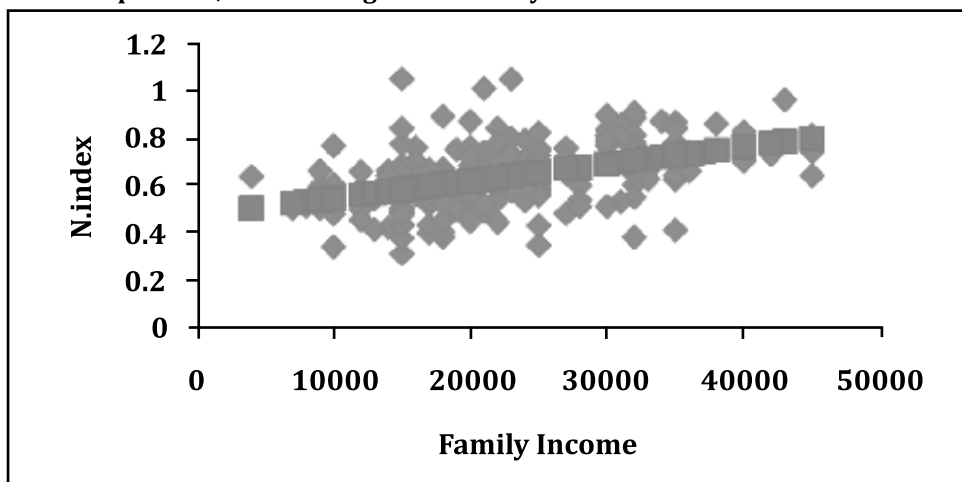
The study has been carried out in two stages. Nutritional status has been measured by nutritional intake index and health status has been measured by BMI. In first stage nutritional intake index has

been computed for each respondent. Nutritional index has been computed for each respondent as the ratio of actual daily food intake and the required intake as suggested by Nutrition expert group I.C.M.R. of the various categories of dietary recommendations. In second stage BMI has been computed using the formula= $\text{kg/m}^2$  for each adolescent girls.

Nutritional Status of adolescent girls by Family income in the study area

The association between income and nutritional status of adolescent girls has been shown by scatter diagram, given below:

**Graph No. 1; Scatter Diagram of Family Income and Nutritional Index**



Source; Computed from primary data

From the above scatter diagram it is observed that the tendency of this line is going upward indicating positive association between nutritional status and family income. The coefficient of correlation( $r$ ) between these two variables is found to be .436. Both the variables are positive associated but the degree of association is moderate ( $<.5$ ) in nature.

After calculating coefficient of correlation, the significant test of correlation has been tested by using SPSS- 20 version, the result has been given below

**Table 2: Result of Significance test of Correlation between Family Income & Nutritional Index**

		<b>Nutritional Index</b>	<b>Family income</b>
Nutritional Index	Pearson Correlation	1	.436**
	Sig. (2-tailed)		.000
	N	200	200
Family Income	Pearson Correlation	.436**	1
	Sig. (2-tailed)	.000	
	N	200	200

Correlation is significant at the 0.01 level (2-tailed).

Above table explains the coefficient of correlation is significant at 5% also at 1% level of significance. The association between family income and nutritional status is shown by the following table

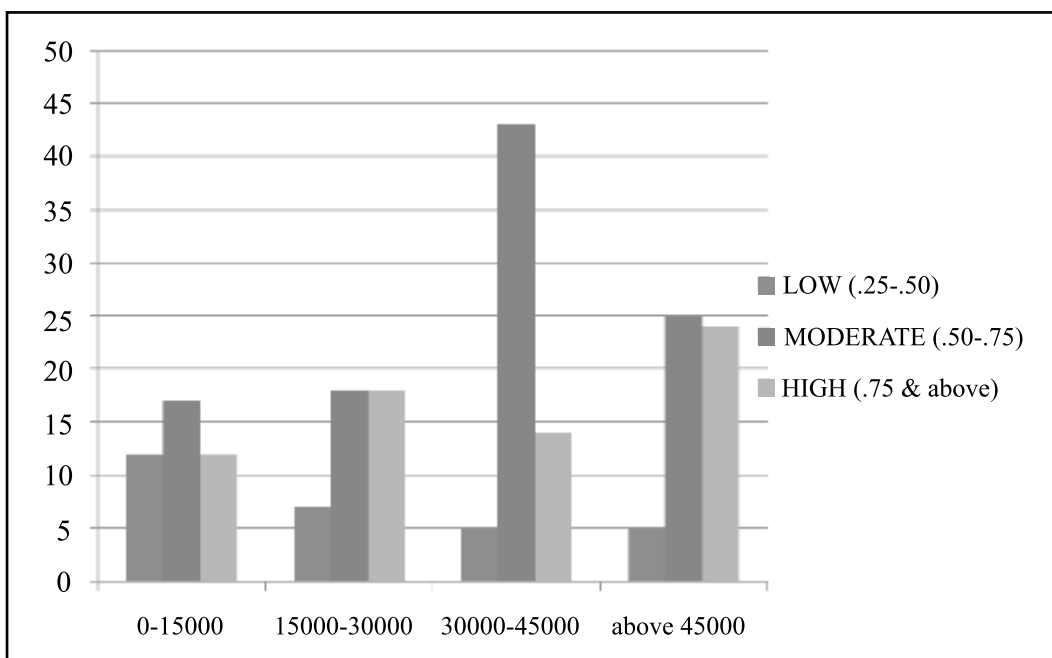
**Table 3; Distribution (%) of Adolescent Girls having Low, Moderate and High Nutrition Index according to Family Income**

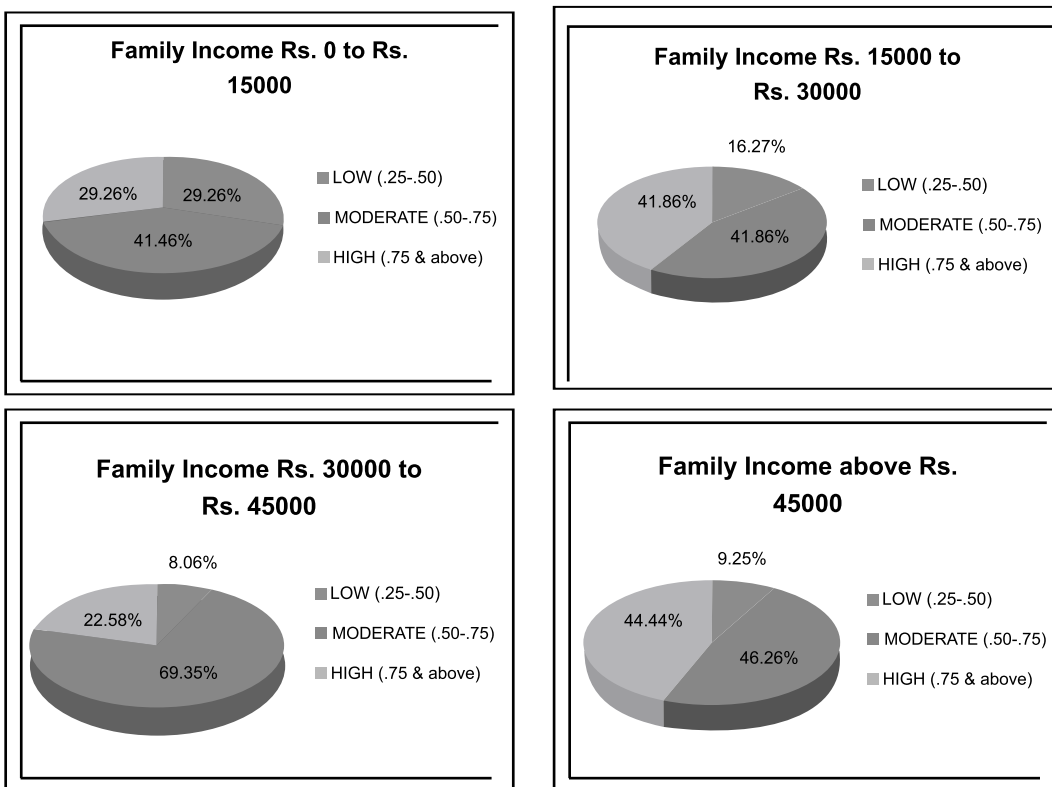
Nutritional Status as measured by Nutritional Intake Index	Family Income (monthly)				Total
	0-15000	15000-30000	30000-45000	above 45000	
LOW (.25-.50)	12(29.26%)	7(16.27%)	5(8.06%)	5(9.25%)	29
MODERATE (.50-.75)	17(41.46%)	18(41.86%)	43(69.35%)	25(46.26%)	103
HIGH (.75 & above)	12(29.26%)	18(41.86%)	14(22.58%)	24(44.44%)	68
Total	41	43	62	54	200

Source; Own Computation from Primary Data

The above table can also be explained by given graph and pie chart

**Graph No. 2; Distribution (%) of Adolescent Girls having Low, Moderate and High Nutrition Index according to Family Income**





Source; Table No. 3

To examine the association between nutritional status measured by nutrition intake and family income, following hypotheses are formulated,

### Null Hypothesis

**H<sub>0</sub>: There is no association between nutritional status and family income. And Alternative Hypothesis is**

**H<sub>1</sub>: There is association between nutritional status and family income.**

To test the hypotheses Chi- Square test at 0.05 has been carried out and the results are as follows-

Hence null hypothesis, there is no discrepancy in nutrition intake of adolescent girls on the basis of family income, is rejected as the value of Chi-square (.002) is less than .05. There is significant relationship between nutritional intake of adolescent girls and family income. So it may safely conclude that there is discrepancy in nutrition intake of adolescent girls on the basis of family income. It implies if income of the family increases, the nutritional status of adolescent girls also improves.

### Status of Health of Adolescent Girls by Family Income in the Study Area

Income of the family and its social status affects the health status. Higher income and social status are linked to better health. The greater the gap between the richest and poorest people, it makes the greater the differences in health. It affects nutrition, apart this, water facility, sanitation facility also affected by family income. So health is most affected by income of the family.

**Table 4; Association between Nutritional Status and Family Income**

<b>Nutritional Intake Index</b>	<b>Family Income (monthly)</b>				
	0-15000	15000-30000	30000-45000	above 45000	Total
Low	12	7	5	5	29
Moderate	17	18	43	25	103
High	12	18	14	24	68
Total	41	43	62	54	200

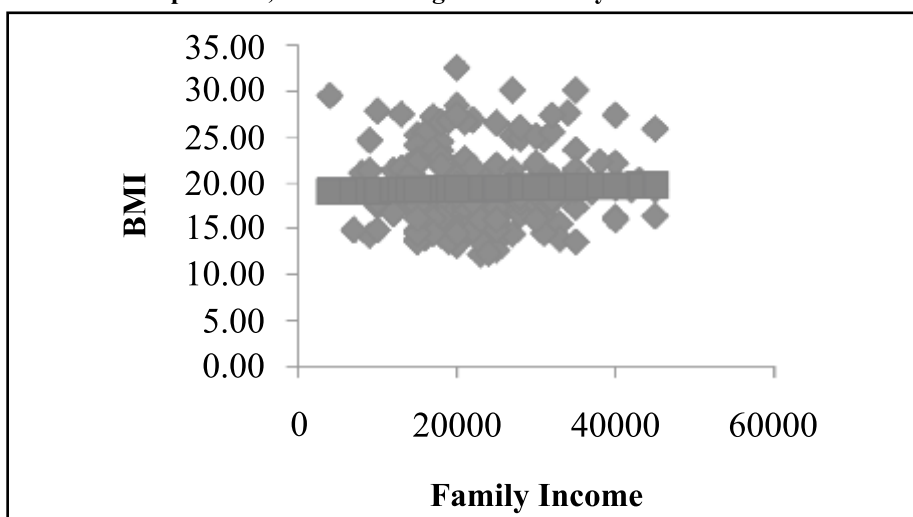
**Expected frequency**

<b>Nutritional Intake Index</b>	<b>Family Income</b>				
	0-15000	15000-30000	30000-45000	above 45000	
Low	5.97	6.27	9.04	7.87	
Moderate	21.22	22.26	32.09	27.95	
High	14.01	14.69	21.19	18.45	
Chi square=	<b>0.00297930</b>				

*Source; Own Computation from Primary Data*

The association between family income and health status of adolescent girls has been shown by scatter diagram, given below. The tendency of this line is going upward i.e. there is positive association between family income and health status.

**Graph No. 3; Scattered diagram of Family Income and BMI**



From the above diagram it is observed that there is positive relationship between nutrition intake and income of the family which indicates if there is increase in income the nutritional status of adolescent girls also improves. After that the coefficient of correlation ( $r$ ) between the two variables has been computed and it was found .035. Both the variables are positive associated but the degree of association is very less (negligible).

The significant test of correlation has been carried out by using given SPSS-20 version. The result has been given below-

**Table 5: Result of Significance test of Correlation  
between Family Income & BMI**

		BMI	INCOME
BMI	Pearson Correlation	1	.012
	Sig. (2-tailed)	.869	
	N	200	200
INCOME	Pearson Correlation	.012	1
	Sig. (2-tailed)	.869	
	N	200	200

*Source: Own Computation from Primary Data*

From the above table it was found that the coefficient of correlation is significant at 5% level of significance. So there is positive association between family income and health status of adolescent girls.

The health status of adolescent girls in the study area has been reflected by the following table

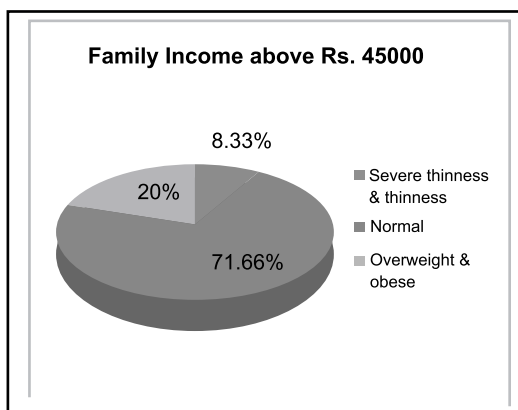
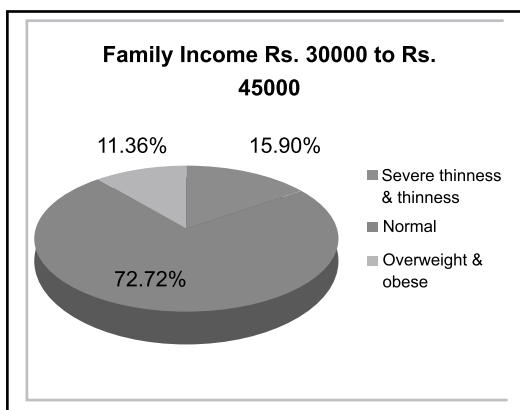
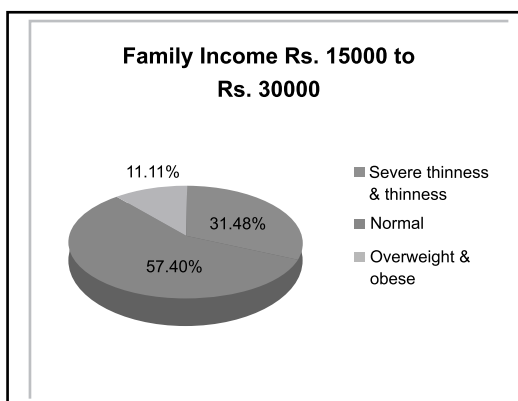
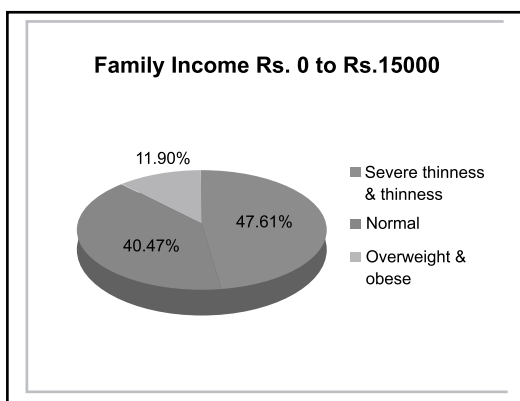
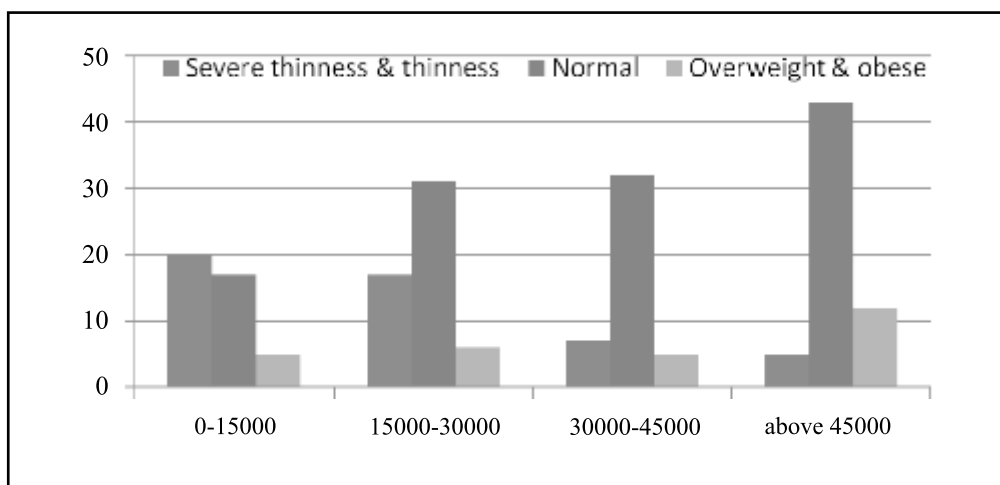
**Table 6; Distribution (%) of Adolescent Girls by different  
level of BMI according to Family Income**

Levels of BMI	Family Income				Total
	0-15000	15000-30000	30000-45000	above 45000	
Severe thinness & thinness	20(47.61%)	17(31.48%)	7(15.90%)	5(08.33%)	49
Normal	17(40.47%)	31(57.40%)	32(72.72%)	43(71.66%)	123
Overweight & obese	5(11.90%)	6(11.11%)	5(11.36%)	12(20%)	28
Total	42	54	44	60	200

*Source- Own Computation from primary data*

The above table can also be represent by following graph and pie chart

**Graph No. 4; Distribution (%) of Adolescent Girls by different level of BMI according to Family Income**



Source; Table No. 6

To examine the association between health status measured by BMI and family income, following hypotheses are formulated,

**Null Hypothesis is**

**$H_0$ : There is no association between health status and family income.**

**And Alternative Hypothesis is**

**$H_1$ : There is association between health status and family income.**

To test the hypotheses Chi- Square test at  $\alpha=0.05$  has been carried out and the results are as follows-

**Table 7; Association between Health Status and Family Income**

Levels of BMI	Family Income				
	0-15000	15000-30000	30000-45000	above 45000	Total
Severe thinness & thinness	20	17	7	5	49
Normal	17	31	32	43	123
Overweight & obese	5	6	5	12	28
Total	42	54	44	60	
Expected frequency					
Levels of BMI	Family Income				
	0-15000	15000-30000	30000-45000	above 45000	
Severe thinness & thinness	10.34	13.30	10.83	14.77	
Normal	25.96	33.38	27.20	37.09	
Overweight & obese	5.91	7.60	6.19	8.44	
Total					
chi square=	<b>0.000322677</b>				

Source; Own Computation from Primary Data

The above table analyses the association between BMI of adolescent girls and income of the family. Hence the value of chi-square is less than .05, the null hypothesis there is no significant relationship between health BMI of the adolescent girl and income of the family, is rejected. It means there is significant relationship between BMI and income of the family. This implies if income of the family increases, the health status-BMI of adolescent girls also increases.

**FINDINGS AND SUGGESTIONS**

Family income is an important factor which affects health and nutritional status of an individual. The findings of this paper are



- There is significant association between family income and nutritional as well as health status of adolescent girls. If income of the family increases the nutritional and health status of adolescent girls also increases.
- The coefficient of correlation( $r$ ) between family income and nutritional status is found to be .436. Both the variables are positively associated but the degree of association is moderate ( $<.5$ ) in nature.
- The coefficient of correlation( $r$ ) between family income and health status is found to be .035. Both the variables are positively associated but the degree of association is negligible.
- Nutritional status directly affected by family income whereas Health status is although affected by family income but also depends upon other factors..

In this study it is found that the health and nutritional status of adolescent girls is largely influenced by income of the family. The average income of the family was found and most of the bread earners of the family were engaged in agriculture and casual labours with irregular income. This is the reason parents are not able to provide adequate diet to their children leading to poor health of the adolescent girls. So improving the economic condition of the family is of paramount importance. Therefore skill enhancement, generation of employment opportunities and provisions for self employment by sanctioning loans are suggested as policy measures. Moreover, health care is also a big issue. Even if the income of the poor families are increased majority of the income is spent on consumption purpose, they do not spend them in health care. So government can enhance the health care facilities for the poor families this would help to improve the health of adolescent girls.

## REFERENCE

- Aber JL, Bennett NG, Conley DC, Li J. (1997) The effects of poverty on child health and development. *Annu Rev Public Health*.
- ACC/SCN. Fourth Report on the world nutrition situation (2000)- Nutrition throughout the life cycle, Geneva: ACC/SCN in collaboration with IFPRI. ([http:// www.unsystem.org/scn/ Publications/ 4RWNS/4rwns.pdf](http://www.unsystem.org/scn/Publications/4RWNS/4rwns.pdf), accessed 26 May 2005).
- Blane D. (1999) The lifecourse, the social gradient and health. In: Marmot M, Wilkinson RG, editors. *Social determinants of health*. Oxford: Oxford University Press.
- Bradley RH, Corwyn RF. (2002) Socioeconomic status and child development. *Annu Rev Psychol*.
- Bradshaw J, editor. (2001) *Poverty: the outcomes for children*. London: Family Policy Studies Centre.
- Brooks-Gunn J, Duncan G. (1997) The effects of poverty on children and youth. *Future Child*.
- Case A, Lubotsky D, Paxson C. (2002) "Economic Status and Health in Childhood: The Origins of the Gradient." *American Economic Review*.
- Ellen IG, Turner MA. (1997) "Does Neighborhood Matter?" *Housing Policy Debate*.
- Gopalan, C. (1989) Women and nutrition in India: general considerations. In: C. Gopalan and S. Kaur, eds. *Women and Nutrition in India*. Special publication series 5. New Delhi: Nutrition Foundation of India.
- Galobardes B, Lynch JW, Davey Smith G. (2004) Childhood socioeconomic circumstances and cause-specific mortality in adulthood: systematic review and interpretation. *Epidemiol Rev* s.

- Ingersoll R. (1999) "The Problem of Under qualified Teachers in American Secondary Schools." Educational Researcher.
- Kao G, Tienda N, Schneider B. (1996) "Racial and Ethnic Variation in Academic Performance." Research in Sociology of Education and Socialization.
- Keating DP, Hertzman C, (1999) Developmental health and the wealth of nations: social, biological and educational dynamics. New York: Guilford Press.
- Kozol J. Savage Inequalities: (1991) Children in America's Schools. New York: Crown; 1991.
- McLoyd VC. (1998) "Socioeconomic Disadvantage and Child Development." American Psychologist.
- Najman JM, Hayatbakhsh MR, Clavarino A, Bor W, O'Callaghan MJ, Williams GM. Family Poverty Over the Early Life Course and Recurrent Adolescent and Young Adult Anxiety and Depression: A Longitudinal Study. American Journal of Public Health. 2010;100(9):1719-23.
- National Nutrition Monitoring Bureau. (1981) Percentage prevalence of deficiency signs (12-21 years) in girls. Report for the year 1981. National Institute of Nutrition, Hyderabad.
- National Research Council, (1995) Commission on Behavioral and Social Sciences and Education. Losing Generations: Adolescents in High-Risk Settings. Washington, DC: National Academy Press.
- Newacheck PW, Hung YY, Park MJ, et al. (2003) Disparities in adolescent health and health care: does socioeconomic status matter? Health Serv Res.
- Oakes J. Multiplying Inequalities: (1990) The Effects of Race, Social Class, and Tracking on Opportunities to Learn Math and Science. Santa Monica, CA: RAND Corporation.
- Reiss F. (2013) Socioeconomic inequalities and mental health problems in children and adolescents: A systematic review. Soc Sci Med.
- Schultz GF. (1993) "Socioeconomic Advantage and Achievement Motivation: Important Mediators of Academic Performance in Minority Children in Urban Schools." Journal of Urban Review.
- Snodgrass SR, Vedanarayanan CC, Parker VV, Parks BR. (2001) "Pediatric Patients with Undetectable Anticonvulsant Blood Levels: Comparison with Compliant Patients." Journal of Child Neurology.
- Spencer NJ. (2000) Poverty and child health. 2nd edition. Oxford: Radcliffe Medical Press.
- Swaminathan, M. S. (2010). "Nutrition of School Children and Adolescents", Handbook of Food and Nutrition, The Bangalore Printing & Publishing Co. Ltd., Bangalore.
- UNFPA, India (2018). "Action for adolescent girls initiative in one block of Udaipur, [www.india.unfpa.org](http://www.india.unfpa.org)
- WHO(2007) . Growth Reference Data for 5 - 19 years . <https://www.who.int/growthref/en/>
- Yen IH, Syme SL. (1999) The social environment and health: a discussion of the epidemiologic literature. Annu Rev Public Health.