



**Full Length Research Article**

**ESTIMATION OF CALORIE CONSUMPTION FROM HIGH VALUE FOOD FOR SCHOOL GOING GIRLS:  
AN AGRO-ECOLOGICAL AND SOCIO-ECONOMIC ANALYSIS**

**<sup>1\*</sup>Acharya, S. K., <sup>2</sup>Das Rama and <sup>1</sup>Lalnunpui Sophie**

<sup>1</sup>Department of Agriculture Extension, Faculty of Agriculture, Bidhan Chandra Krishi Viswavidyalaya, West Bengal, India

<sup>2</sup>Barrackpore Rastraguru Surendranath College, Barrackpore, West Bengal, Kolkata – 700 120, India

**ARTICLE INFO**

**Article History:**

Received 22<sup>nd</sup> March, 2014  
Received in revised form  
03<sup>rd</sup> April, 2014  
Accepted 05<sup>th</sup> May, 2014  
Published online 25<sup>th</sup> June, 2014

**Key words:**

Agro-economical,  
Crop yield,  
High value food,  
Home consumption,  
Nutritional status,  
Socio-personal,,  
Subsidiary income.

**ABSTRACT**

The menace of malnutrition has been considered as the deadliest factor causing great hindrance towards ensuring a decent and secure livelihood. Basically, the problem of malnutrition has got social, political, technical and motivational dimensions as well. Education being the basic driving force for any economy and progress per se, the school going children need to be focused and attended comprehensively so that they can grow up themselves as healthy citizens having belligerent mind and body. But unfortunately almost 80% of the school going children in India are suffering from deleterious impact of malnutrition leading to poor performance, malfunctioning, stunted growth, vulnerable to diseases, morbidity and so on. Instantly, the entire exercise over the research text of child nutrition has confirmed that nutrition is basically a complex phenomena and cannot be managed in the single intervention. It's not be a single chance factor either. In this study, the nutrition has been conceived as a composite configuration of food intake, calorie intake, high value food intake, sanitation and total calorie intake. It depicts that the predictor variables like age, training, family size, subsidiary income, parents education, crop yield etc. have become predominant factors in preparing a discernable difference between high and low level of nutrition status among the respondents.

Copyright © 2014 Acharya et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

**INTRODUCTION**

Across the world, the problem of malnutrition has been perceived as the most dangerous and menacing factors towards ensuring a decent and secure livelihood. The situation has gone further worse for some African and South East Asian countries. The problem of malnutrition has got social, political, technical and motivational dimensions as well. Education being the basic need for any economic and social progress per se, the school going children required to be focused and attended comprehensively so that they can grow up themselves as the healthy citizens having belligerent mind and body. But unfortunately, almost 80% of the school going children in India are suffering from deleterious impact of malnutrition leading to poor performance, malfunctioning, stunted growth, vulnerable to diseases and morbidity and so on. Malnutrition is not only a biological phenomena, it is a synergy of biophysical as well as socio-economical process.

Access to food, sufficient and nutritionally rich, is also one of the discerning factors that impacts heavily on the nutritional aspects on the school children. The analysis of malnutrition needs a complex framework gridding all the cognate factors like size of holding, parental education, food intake volume, energy intake, chronological age, ill behavior of agriculture, information seeking behavior, medical and health care and so on. Changes in global food prices will have a greater effect on food consumption in lower income countries and in poorer households within countries. In all countries, poorer households will be the most adversely affected section with increase in food prices. This has important implications for national responses to increases in food prices and for the definition of policies designated to reduce the global burden of under-nutrition (Green Rosemary et al., 2013). The adjustments of demand limit weakly the negative impact of rising prices. This effect depends also on goods. Indeed for meat and dairy products, for an increase by 10% in price - case long-term – the gap between both variations is 0.1 point while for a same level of rising - case 2008 (for corn the gap is void). This naturally depends also on the value of the own-price of the Hicksian demand. The more elastic demand is, the

**\*Corresponding author: Acharya, S. K.,**

Department of Agriculture Extension, Faculty of Agriculture, Bidhan Chandra Krishi Viswavidyalaya, West Bengal, India

more important the gap between before and after adjustment will be. This effect is especially high if the budgetary share is important. (Pons Nathalie, 2011) Low-income countries spend a greater portion of their budget on necessities, such as food, while richer countries spend a greater proportion of their income on luxuries, such as recreation. Low-value staples, such as cereals, account for a larger share of the food budget in poorer countries, while high-value food items are a larger share of the food budget in richer countries. Overall low-income countries are more responsive to changes in income and food prices and, therefore, make larger adjustments to their food consumption pattern when incomes and prices change. (Mohammad Andrew et. al., 2011) Cross-sectional study after examining data over 800 school children aging between 5-11 led to the view that 49.5% of them were found to be malnourished out of which Grade I malnutrition was most common (35.5%) followed by grade II (11.4%) and grade III (2.6%) malnutrition. (Neelu Saluja et. al., 2010) Children and adolescents are considered to be the backbone of any nation. Materials and methods for data collection: distribution of children by age and sex; distribution of children as per their mean height and mean weight, nutritional status of children as per age and sex (wasting); nutritional status of children as per age and sex (stunting). The nutritional hazards of school children under study were found to be low, more so in girls than in boys in spite of the mid-day meal programme being run in all the schools. (J. Semwal et. al., 2006)

### Objectives

- To assess the calorie consumption from high value food of school going girls in terms of agro-economic and socio-personal variables.
- To assess the role of agro-economic and socio-personal variables in characterizing the primary respondents as dependent variable.
- To assess the interrelationship, both at Inter and Intra level, between the dependent and independent variables.
- To derive some strategic implication from the study for subsequent application towards mitigating the problem on nutrition management in a broader perspective.

## MATERIALS AND METHODS

### Selection of Locale

The locale of the study was selected based on the following criteria :

#### STAGE – I

*Champhai* district was selected purposefully because of its advantageous geographical location and respondents of school children of the age category we were looking for.

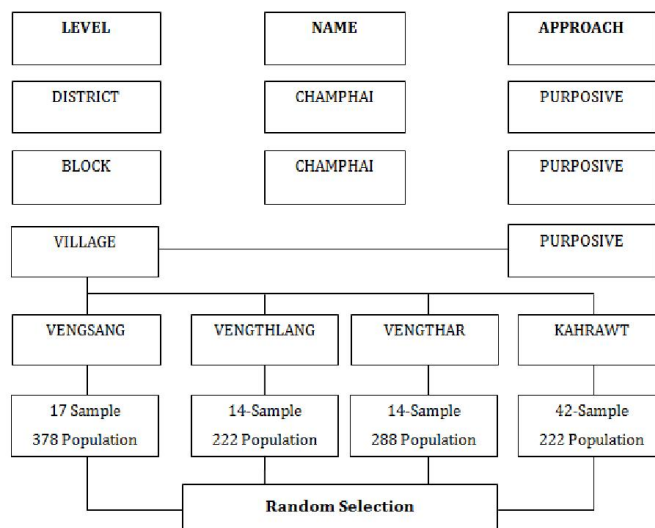
#### STAGE – II

*Champhai* district is divided into four rural development blocks namely, *Khawbung*, *Khawzawl*, *Ngopa* and *Chamhai*. For data collection, one block, *Champhai* block is selected because of its location, accessibility and four localities from it were selected subsequently.

#### STAGE – III

Four localities, namely, *Vengsang*, *Kahrawt*, *Vengthlang* and *Vengthar* were selected to make the sample respondents representative geographically, culturally and socially.

### Selection of Respondents



### Independent Variables

Age ( $X_1$ ), Education ( $X_2$ ), Parental education ( $X_3$ ), Family Size ( $X_4$ ), Size of Homestead Land ( $X_5$ ), Size of Agricultural Land ( $X_6$ ), Agriculture Income ( $X_7$ ), Subsidiary Income ( $X_8$ ), Total Income ( $X_9$ ), Total Crop Yield ( $X_{10}$ ), Home Consumption ( $X_{11}$ ), Training ( $X_{12}$ ).

### Dependent Variable

Calorie Consumption from High Value Food ( $Y$ )

### Statistical Tools Used

1	CV (Co-efficient of Variation)
2	r (Co-relation)
3	$\frac{dy}{dx}$ (Path Analysis)
4	$D^2$ (Discriminant Function Analysis)

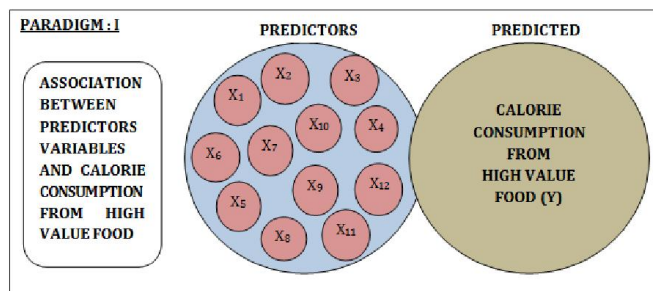
## RESULTS AND DISCUSSION

**Table 1. Coefficient of correlation between calorie consumption from high value food ( $Y$ ) Vs twelve (12) independent variables**

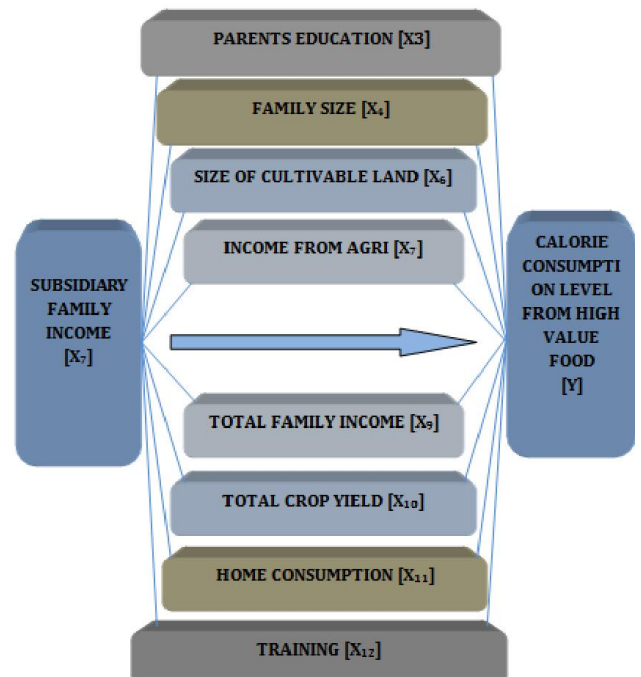
Variables	R Value
Age ( $X_1$ )	0.08
Education ( $X_2$ )	0.08
Parental Education ( $X_3$ )	0.11
Family Size ( $X_4$ )	0.08
Size of Homestead Land ( $X_5$ )	0.05
Size of Cultivable Land ( $X_6$ )	-0.01
Family Income (Agri) ( $X_7$ )	0.07
Family Income (Subsidiary) ( $X_8$ )	-0.09
Total Family Income ( $X_9$ )	0.00
Total Crop Yield ( $X_{10}$ )	0.09
Home Consumption ( $X_{11}$ )	0.10
Training ( $X_{12}$ )	-0.09

The above table presents the coefficient of correlation between calorie consumption of high value food and the 12 independent variables. The table depicts that none of the variable has recorded significant correlation that does not necessarily mean that the

interactive relationship between the variables have got no social implication. This variable might have recorded a significant relationship given the level of significance has been fixed at 10 or 20% that is why some of the variables (3) in order of coefficient of correlation value have been selected for discussion. parent's education has recorded perceptible relationship with calorie consumption level that indicates that a parent having higher education is more careful to the nutritional management of their kids with respect to the higher level of calorie consumption. The other 2 variable in order of relationship which has come up to the tally are home consumption and food income. The above table presents the path analysis between calorie consumption from high value food (Y) and 12 exogenous variables in terms of direct, indirect and residual effect.



**Paradigm: II**



**Path analysis: Caloric consumption level from high value food (Y) Vs 12 exogenous variables**

**Table 2. Path Analysis: Direct, Indirect and Residual Effect**

Variables	Direct Effect	Indirect Effect	Total Effect	Substantial Indirect Effect		
				I	II	III
Age (X <sub>1</sub> )	0.0664	0.0172	0.0657	0.037 (X <sub>2</sub> )	0.0297 (X <sub>12</sub> )	-0.0274 (X <sub>8</sub> )
Education (X <sub>2</sub> )	0.0399	0.0351	0.1015	0.0626 (X <sub>1</sub> )	-0.0475 (X <sub>8</sub> )	0.0299 (X <sub>12</sub> )
Parental Education (X <sub>3</sub> )	0.2091 (2 <sup>nd</sup> )	-0.0948	-0.0549	0.1066 (X <sub>8</sub> )	0.0402 (X <sub>9</sub> )	-0.0221 (X <sub>4</sub> )
Family Size (X <sub>4</sub> )	-0.1023	0.1808	0.3899	0.1211 (X <sub>8</sub> )	0.0451 (X <sub>3</sub> )	-0.0268 (X <sub>6</sub> )
Size of Homestead Land (X <sub>5</sub> )	0.0873	-0.042	-0.1443	-0.0676 (X <sub>6</sub> )	0.0674 (X <sub>8</sub> )	0.0334 (X <sub>3</sub> )
Size of Cultivable Land (X <sub>6</sub> )	-0.1016	0.0884	0.1757	0.0634 (X <sub>8</sub> )	0.0581 (X <sub>5</sub> )	0.00580 (X <sub>11</sub> )
Family Income (Agri) (X <sub>7</sub> )	-0.0344	0.102	0.0004	0.0741 (X <sub>8</sub> )	0.0741 (X <sub>9</sub> )	-0.0526 (X <sub>12</sub> )
Family Income (Subsidiary) (X <sub>8</sub> )	-0.2771 (1 <sup>st</sup> )	0.1904	0.156	0.0805 (X <sub>3</sub> )	0.0449 (X <sub>9</sub> )	0.0447 (X <sub>4</sub> )
Total Family Income (X <sub>9</sub> )	0.1039	-0.0985	-0.3756	-0.1197 (X <sub>8</sub> )	0.0809 (X <sub>3</sub> )	-0.0410 (X <sub>12</sub> )
Total Crop Yield (X <sub>10</sub> )	0.0439	0.0474	0.1513	0.0727 (X <sub>8</sub> )	-0.0587 (X <sub>12</sub> )	0.0562 (X <sub>9</sub> )
Home Consumption (X <sub>11</sub> )	0.0447	0.0551	0.099	0.0718 (X <sub>8</sub> )	-0.0502 (X <sub>12</sub> )	0.0298 (X <sub>10</sub> )
Training (X <sub>12</sub> )	-0.1588 (3 <sup>rd</sup> )	0.0648	0.1095	0.0328 (X <sub>8</sub> )	0.0268 (X <sub>9</sub> )	0.0229 (X <sub>3</sub> )

Residual Effect: 0.9246

It has been found that the variable subsidiary family income, parent's education and training have recorded substantive direct effect on the calorie consumption level. Family income indicates the families' financial capability to support calorie consumption level. Parents' education and training have moderate impact on the calorie consumption level. Family income here (X<sub>8</sub>) has got highest indirect impact in the calorie consumption level. Income as a source and means has come up predominantly in ensuring calorie consumption. The variable family income from subsidiary sources (X<sub>8</sub>) has routed the highest indirect effect of as many as 8 variables towards characterizing the predicted character calorie consumption

level. Any income from subsidiary sources has got, especially in the middle class and poor family under quantity and quality of food access.

The residual effect being 0.9245, it could be infer that dealing with the combinations of 12 variables only 8% of this relationship could have been cap laired. Certainly the explanations are giving based on the decomposed values but met in totality. Here, some dents are only discussed to assess the direction of influences.

**Table 3. Discriminant analysis: Caloric consumption from high value food (y) and 12 independent variables**

Variables	L(I)	L(I)*D(I)	L(I)*D(I)*100/D2 values	Rank
Age (X <sub>1</sub> )	0.4659	-0.0699	-9.2987	
Education (X <sub>2</sub> )	-0.5485	0.1371	18.2481	III
Parents Education (X <sub>3</sub> )	-0.1578	0.2130	28.3394	II
Family Size (X <sub>4</sub> )	0.3940	0.0099	1.3108	
Size of Homestead Land (X <sub>5</sub> )	0.0119	0.1304	17.3562	
Size of Cultivable Land (X <sub>6</sub> )	-0.0014	-0.0167	-2.2259	
Family Income (Agri) (X <sub>7</sub> )	-0.0019	0.2583	34.3755	I
Family Income (Subsidiary) (X <sub>8</sub> )	0.0015	0.0737	9.8133	
Total Family Income (X <sub>9</sub> )	0.0009	-0.0871	-11.5918	
Total Crop Yield (X <sub>10</sub> )	-0.0001	0.0124	1.6436	
Home Consumption (X <sub>11</sub> )	0.0041	0.0121	1.6150	
Training (X <sub>12</sub> )	0.3130	0.0783	10.4144	

D-SQUARE = 0.75148470E+00

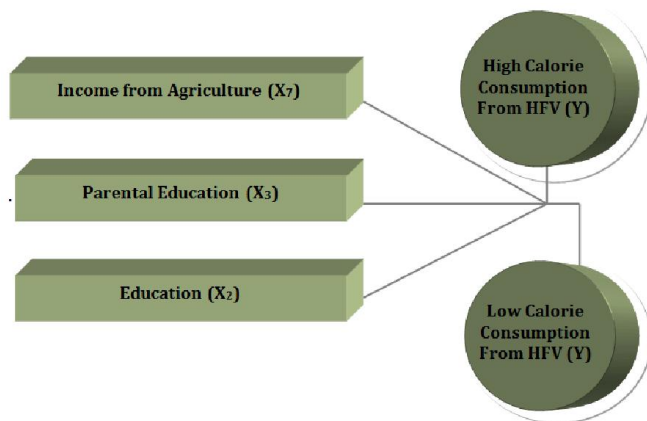
HOTELLING T SQUARE = 0.15029690E+02

F VALUE FOR TESTING T-SQUARE = 1.076 WITH 12 AND 67 D.F.

CENTROID DISCRIMINANT SCORE FOR GROUPS 1 AND 2 ARE 5.4320 AND 4.6805

The above TABLE-III presents the discriminant analysis to assess the discriminatory function in creating a difference between high and low level behavior of dependent variable and the respective contribution of different independent variable that has gone critical in creating this gap. The discriminant analysis in TABLE-III reveals that the variable income from Agriculture has got the highest discriminatory function in creating variation of calorie consumption from high value food among the respondents. It has been followed by other two variables, parents’ education and education of the respondents. The higher proportion of income from agriculture goes proximately with calorie consumption level. So, these three variables in order of importance might be conceived while management strategy will be taken out to ensure the calorie consumption from high value food of the respondents.

**PARADIGM: III**



**Discriminant function: Calorie consumption from intake of high value food (Y) Vs 12 casual factors**

**Limitations of the study**

Despite of being a unique one the present study has suffered some limitations:

- The concept of nutrition and its management across the world is still evolving and not even a single standard parameter is available to measure the nutrition of body or that of the mind. Some scales are used wherein elements of fluidity remains as an intrinsic limitation to use it.
- The number of variables should have been more and some of them have become overlapping by nature.

- Inclusion of some case study would have better in substantiating the residual effect, the extraneous events/character that could not be explained.

**Future scope of research**

The limitations of the study as discussed earlier itself generate the future scope of research. So, the following are the future study of research by granting the present one as a modestly conducted study in areas of child nutrition:

- ✓ Generating process and product indicator to measure the functional aspects of nutritional management and their impact on child health.
- ✓ Gender issues as prevalent in farm families in regard to accessing equity of nutritional status.
- ✓ Role of IT and ICT in managing nutrition and tackling problem of malnutrition by providing e-forecasting and e-messages.
- ✓ Modeling the complexity and polymorphic character of nutrition management by applying advanced statistical tools and approaches.
- ✓ Production, perception and application of changed management in the perspective of global warming and climate change.
- ✓ Participatory nutrition management by using traditional food and ethnic medicines, especially for rural and tribal communities.

**Conclusion**

The entire exercise over the research text of child nutrition has proved that the nutrition is basically a complex phenomena and cannot be managed in the single intervention, it’s not been a single chance factor either. In this study, the nutrition has been conceived as a composite configuration of food intake, calorie intake, high value food intake, sanitation and total calorie intake. It depicts that the predictor variables like age, training, family size, subsidiary income, parents education, crop yield etc. have become predominant factors in making a discernable difference between high and low level of nutrition status among the respondents. Some important indicators however are missing from the study and these are Body Mas Index (BMI), haemoglobin level in blood and anaemic level and other disease frequently and vulnerability level. There are elements of contradictions between amount of food consume and calorie intake, proportion between common food and high value food,

explicit hunger and implicit hunger and so on. In near future, the earth population will be more hungry and the hunger map will keep swallowing almost 80% of the geographical area. Every new nation against every month will be joining the row of hungry nations. The climate change and global warming are exerting more and more stress of the productive behavior of different crops, fishes and animal resources too. It is estimated that in the next five years another 400 million people will turn hungry to add to unmanageable social entropy. That's why the present research is leaving behind threads of future research for modeling a resilient system towards managing malnutrition and confronting the challenges of hunger, poverty and voicelessness.

## REFERENCES

- Green Rosemary, Laura Cornelsen, Alan Dangour, Rachel Turner, Bhavani Shankar, Mario Mazzocchi, Richard D. Smith, June 2013, The Effect of Rising Food Prices on Food Consumption L Systematic Review With Meta-regression, *Bio Medical Journal*, 2013: 346: f3703
- Pons Nathalie, 2011, Food and Prices in India: Impact of Rising Food Prices on Welfare Centre de Sciences Humaines (Delhi)
- Mohammad Andrew, James L. Seale. Jr., Brigit Meade & Anita Regmi, March 2011, International Evidence on Food Consumption Patterns: An Update Using 2005 International Comparison Program Data, Economic Research Service, United States Department of Agriculture, *Technical Bulletin* No. (TB-1929) 59 pp.
- Neelu Saluja, Bhatnagar M., Garg S.K., Chopra H., Bajpai S.K., 2010, Nutritional Status of Urban Primary School Children in Meerut, *The Internet Journal of Epidemiology*, ISSN: 1540-2614, 8(1)
- Semwal J., Srivistava A.K., Gupta S., Kishore S., Chandra R., 2006, Nutritional Status of School Children in Rural Areas of Dehradun District, *India Journal of Prev. Soc. Mecl.*, Vol. 37 (1&2).

\*\*\*\*\*