

# Reliability and Validity of Household Food Insecurity Access Scale in Assam, India

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**Abstract:** The ability of the household to access adequate quantity and quality of food is essential to ensure food security. Experience based Household Food Insecurity Access Scale (HFIAS) is a simple measure of quality and quantity of food intake to examine the food security status of the household. The present study examines the reliability and validity of HFIAS to measure food security status of rural and urban households of Assam. The reliability statistic Cronbach's  $\alpha$  is used to test the internal consistency of the scale and it is found to be consistent in the context of Assam with  $\alpha$  value greater than 0.7. Multitrait Multiitem Correlation matrix validates the scale and external validity is shown in terms of association of this scale with factors affecting household food security. A multistage random sampling was carried out and HFIAS questionnaire was administered among 310 rural and 426 urban household of four districts of Assam, namely Tinsukia, Sivasagar, Jorhat and Lakhimpur. The study makes an attempt to identify and compare the food security status of rural and urban households. Food insecurity among rural households are found to be higher than its urban counterpart. There is need of study and research to identify the context specific factors of generating food insecurity in the state and thereby to ensure that people will enjoy the basic right to food.

**Keywords:** Food Security, Household Food Insecurity Access Scale, Reliability, Validity, Insufficient Quality, Insufficient Quantity.

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## I. INTRODUCTION

Food security is a multidimensional and complex phenomenon. Achieving food security is a serious matter of concern for each country of the world. The Food and Agricultural Organization (FAO) at world Food Summit in 1996 defined that- "Food Security exist when all people ,at all times have physical and economic access to sufficient and nutritious food to meet their dietary needs and food preference for a healthy and active life." Thus the lack of sufficient and nutritious food creates hunger and food insecurity which directly affects the living condition of the people. Globally 815 million people remain hungry during 2016 [1]. Out of this 520 million hungry people lives in Asia. India as a developing country is continuously facing this serious challenge. In 2017 Global Hunger Index (GHI), India scored 31.4 and was placed in high end of 'serious' category. More than 20 percent of Indian children under the age of five are wasted and 33 percent are stunted. Despite being world's second largest food producer India has second highest undernourished population in the world. Food insecurity affects both rural and urban population of a country. However the rural poor people, especially the women and children are more vulnerable to food and nutrition insecurity.

The food security status mostly depends on ability of the household to access adequate quantity of quality food. It is the food accessibility of the consumers which reflects their demand side response of food articles to maintain a healthy life. Lack of accessibility of adequate quality food results in household food insecurity (HFI). With increasing severity of food insecurity, the household needs to adjust their food budget, reduce their food consumption, limit variety of food and live in anxiety of hunger and starvation in near coming days. In India, research and literature on experience based household food insecurity is found to be limited. The National Sample Survey Organization (NSSO) survey includes only one

question on household daily access to food, which is inadequate to comprehensively capture the intensity of HFI [2]. The National Family Health Survey (NFHS) measures diet diversity, but not HFI [3]. Experience based household food insecurity questions are found to be relevant in developing countries to measure ability of the households to access adequate quantity and quality food. Household income and calorie measurement are not able to reflect properly the insufficiency of quality food intake. Moreover, Household level measures of food access, such as income and caloric adequacy have been technically difficult, data intensive and costly to collect [4]. United States Agency for International Development (USAID)'s Food and Technical Assistance (FANTA) project developed a set of questions to measure households' experience and anxiety of food insecurity, which is based on different culture and country settings to distinguish between food secure and food insecure households. Recently field validation studies of this approach to measuring food insecurity (access) more directly, by constructing measures based on households experience of the problem, have demonstrated the feasibility and usefulness of the approach in different developing country contexts [4]. In 2000, the FANTA Project adopted the 18 item scale to developing country contexts and came up with the 9 item HFIAS [3]. The HFIAS consists nine "occurrence questions" regarding the experience in last four weeks (30 days) and thereby nine "follow up" questions. The "occurrence questions" ask whether a specific condition associated with the experience of food insecurity ever occurred during the previous four weeks. The follow up questions ask how often a reported condition occurred during the previous four weeks. The occurrence questions cover three domains of food security [4]

a) Anxiety and Uncertainty about the Household Food Supply :

Q1. Did you worry that your household would not have enough food ?

b) Insufficient Quality (includes variety and preferences of the type of food):

Q2. Were you or any household member not able to eat the kind of food you preferred because of lack of resources ?

Q3. Did you or any household member have to eat a limited variety of foods due to lack of resources ?

Q4. Did you or any household member have to eat some foods that you really did not want to eat because of lack of resources to obtain other types of food.

c) Insufficient food intake and its physical consequences :

Q5. Did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?

Q6. Did you or any household member have to eat fewer meals in a day because there was not enough food?

Q7. Was there ever no food to eat of any kind in your household because of a lack of resources to get food?

Q8. Did you or any household member go to sleep at night hungry because there was not enough food?

Q9. Did you or any household member go a whole day and night without eating anything because there was not enough food.

The categorical indicator of food insecurity status based on HFIAS is Household Food Insecurity Access Prevalence (HFIAP). This indicator can be used to report household food insecurity (access) prevalence and make geographic targeting decisions. The food insecurity status of different regions, locality, rural and urban areas etc can be better evaluated with this prevalence indicator and thereby spatial interventions can be initiated to tackle the problem of food insecurity in these areas. According to most severe response the households are categorized as : Food Secure, Mildly Food Insecure, Moderately Food Insecure and Severely Food Insecure.

## II. OBJECTIVE

The basic objective of this study is to examine the reliability and validity of HFIAS to measure the household food security status of the people of Assam. In Assam majority of people lives in rural areas facing acute shortage of quality food. HFIAS as a simple measure of food accessibility is tested to assess the household food security status of rural and urban household of the state.

### III. MATERIAL AND METHODS

#### SAMPLING DESIGN AND SAMPLE SIZE

The study was carried out in four districts of Assam: Tinsukia, Jorhat, Sivasagar and Lakhimpur during June to December, 2013. Multistage sampling procedure is followed to determine the final sampling unit. In the first stage four districts are selected on the basis of Assam Human Development Report, 2003. The Human Development Index (HDI) value for two districts Jorhat and Sivasagar are above the state average while other two districts Tinsukia and Lakhimpur have HDI value below the state average. In the second stage each district is classified as rural and urban. Two blocks from rural area and two towns from each urban area are selected randomly in the third stage of sampling. In fourth stage two villages from each block and two wards from each town are selected randomly. In the final stage the study selects 10 percent of total households having women in reproductive age group of 15-59 from each sample village and ward. The total of 16 villages and 16 wards are selected for sample survey. Total sample size is 736, out of which 310 are rural and 426 are urban households.

#### STUDY RESPONDENT

The HFIAS questionnaire was administered to collect information regarding anxiety, uncertainty and intake of adequate quality food for the household members. It is the women of the household who mainly concerned with food preparation, food demand and quality of food consumed. Therefore the women of the household were interviewed with HFIAS questionnaire.

#### STATISTICAL METHOD

The HFIAS like any other scale needs to examine its expected internal structure or consistency and its external validity. "Internal consistency relates how well the items correlate with total score and measure the same underlying construct. External validity refers to how well the scale relates to other variables that are known to be related to such construct" [5]. The reliability statistic Cronbach's  $\alpha$  is used to test the internal consistency of insufficient quality and insufficient quantity domain of HFIAS. The two fundamental aspects of construct validity are- Convergent and Discriminant validity which are tested in terms of Multitrait Multiitem (MTMI) correlation matrix. The external validity of the scale is assessed in terms of association of HFIAS indicator with other factors affecting household food security status.

### IV. RESULTS AND DISCUSSION

#### INTERNAL STRUCTURE OR CONSISTENCY

The internal structure of a scale can be tested through reliability and validity of the structure in a particular setting.

- **Reliability:** Rasch reliability, Point bi serial and Cronbach's  $\alpha$  are helpful to detect internal reliability of the experience based HFIAS. There is limited literature to review that a particular statistical analysis is more suitable to food security status in India. The available literature mostly use **Cronbach's  $\alpha$  coefficient** to test the reliability of 9 items HFIAS in Indian context [6], [7], [8],[9],[10]. In most social science research reliability coefficient Cronbach's  $\alpha$  equal to 0.7 and greater is considered as reliable. The reliability of HFIAS questionnaire is tested by assessing the items in insufficient quality domains and also for the items in insufficient food intake or quantity domain with the help of Cronbach's  $\alpha$  coefficient and found reliable (Table-I) for this study.

TABLE I: Cronbach's  $\alpha$  for reliability of HFIAS

Insufficient Quality	0.749
Insufficient Food Intake	0.763

Source: Authors' estimation

- **Construct Validity:** Construct Validity defines how well a test or experiment measures up to its claims. It refers to whether the operational definition of a variable actually reflect the true theoretical meaning of a concept[11]. The two fundamental aspects of construct validity are- Convergent and Discriminant validity. Convergent validity is designed to measure the same construct should correlate highly among themselves. Convergent Validity has been considered

satisfactory if the correlation between an item and its hypothesized scale is 0.40 and above [12],[13]. On the other hand, Discriminant validity test that the construct being measured should not correlate highly with different constructs. Discriminant Validity of an item is supported if the within scale correlation is significantly higher than between scale correlation[14]. The convergent and discriminant validity is used in the scale analysis of Multitrait Multiitem(MTMI) Correlation Matrix that focuses on items as the unit of analysis [12]. The convergent and discriminant validity of HFIAS is tested here with MTMI correlation matrix as presented in Table-II. The table shows that the correlation of items (except Q8 and Q9) belonging to both scales with its own hypothesized scale is greater than 0.4. Thus the items satisfy convergent validity. The correlation of item Q8 and Q9 with its own scale is 0.296 and 0.279 respectively (i.e <0.4), thereby not able to satisfy convergent validity. On the other hand, the items of IQ scale (Q2,Q3 & Q4) and items of IFI scale (Q5, Q6, Q7,Q8 & Q9) have higher correlation with their own scale in comparison to the correlation with other scale. Thus all the items in both scales satisfy discriminant validity and can be retained in the respective scales .Moreover in all the items of both scales the discriminating value (i.e the difference between correlation with own scale and correlation with other scale) is greater than 0.2 . Literature shows that the items with discriminating value >0.2 satisfy discriminant validity [15]. The items Q8 and Q9 although not able to satisfy convergent validity , satisfies discriminant validity and is thus retained in the HFIAS questionnaire to collect information about food security status of the households.

- **External Validity:** The HFIAS has negative association with per capita monthly income and education of the income generating members of the household and positive association with family size. The rural household food security also depends on agricultural land owned, ownership of livestock and poultry and home garden production of food crops. The association of these factors with HFIAS is the external validity of this experience based scale.

**TABLE II. Multitrait Multiitem (MTMI) Correlation Matrix**

Items	Insufficient Quality (IQ)	Insufficient Food Intake (IFI)	Discriminant Value
Q2	0.548	0.244	0.304
Q3	0.674	0.222	0.452
Q4	0.587	0.350	0.237
Q5	0.378	0.629	0.251
Q6	0.258	0.748	0.490
Q7	0.148	0.550	0.402
Q8	0.066	0.296	0.230
Q9	0.034	0.279	0.245

Source: Authors' estimation

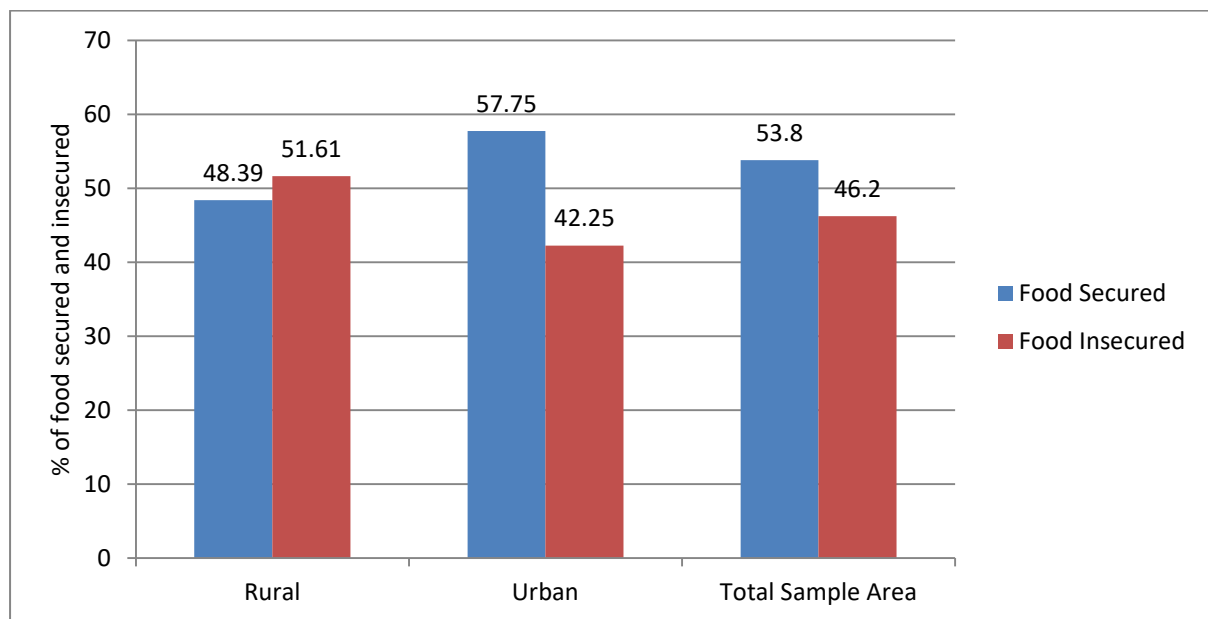
### ***Household Food Security Status on the basis of HFIAS***

The HFIAS is found to be reliable and valid to examine the household food security status of the people of Assam with slight modification of term used in the questionnaire so that local people can understand the question and is able to answer it properly. Using HFIAS questionnaire in local (Assamese) language the present study found that total food secured household in the study area is 53.8 percent while 46.2 percent are food insecure (Table III ). Household food insecurity is found to be higher in rural areas (51.61%) as compared to urban areas (42.25%). There are several factors that may affect the household food security status. The study observed that Per Capita monthly Income and food insecurity has a negative association. Per Capita monthly Income of the rural household is lower as compared to urban household which affects their accessibility of food items.

**TABLE III. Food security Prevalence of sample households as measured by HFIAS**

Residential Status	Food Secured N (%)	Food In secured N (%)	Total	Test Statistic
Rural	150(48.39)	160 (51.61)	310 (100)	$\chi^2 = 7.53$ P= 0.057
Urban	246 (57.75)	180 (42.25)	426 (100)	
Total Sample Area	396 (53.80)	340 (46.20)	736 (100)	

Source: Field Survey, 2013



**Figure1: Percentage distribution of food secured and food insecure household**

The larger rural household size due to joint family system and non adoption of family planning measures also lack quantity and quality of food. The means of livelihood in rural area are limited. Rural households have to satisfy their consumption demand with limited variety due to limited accessibility. Home garden production of crop and access to livestock can be used as an income generating and risk mitigating strategy of stable food supply. Scope of agricultural income is limited due to effect of flood in agricultural land. Labourers move to urban areas in search of job. In the absence of diversified sources of income urban food security status may deteriorate. Diversified sources of livelihood are a required strategy to maintain a basic standard of living with adequate quantity and quality of food.

## V. CONCLUSION

The HFIAS is a simple indicator of food accessibility. It is a reliable and valid tool to measure the extent of food security in Assam with slight modification of terms used in the standard questionnaire. The main strength of this study is that experience based HFIAS can be used to make a comparison between rural and urban household regarding their food accessibility. It may help the government and policy makers to adopt specific intervention for the targeting group of people. The factors affecting rural and urban household food security may be different which is not analysed in this study and considered as a limitation of the study. Further research in this regard may be suggested that would be helpful to assess the external validity of 9 items HFIAS in the context of Assam. The extensive research on HFIAS in different socio cultural setting will have wide implications in examining the reliability and validity of experience based HFIAS as an indicator of household food security.

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