Original Research Article

Dietary diversity as an indicator of intra-household food accessibility: Findings from a rural community of Varanasi district

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ABSTRACT

Background: Household dietary diversity is an attractive proxy indicator for the food accessibility in the household. A more diversified diet is an important outcome in areas such as child birth weight, anthropometric status, and improved haemoglobin concentrations in women of reproductive age group. Dietary diversity at the household or individual level makes it possible to examine food accessibility and ultimately security at the household and intra-household levels. 

Objective: To assess the intra-household dietary diversity of rural women of reproductive age group to identify the accessibility of different food groups in their community. Study Area: Chirigaon community development block of Varanasi district of Uttar Pradesh. Study Design: Community based cross sectional design. Study Sample: 610 Non pregnant women of reproductive age group (15–49 years). Sampling Methodology: The required sample size was selected by adopting multi stage random sampling procedure. Tools and Techniques of the Study: Subjects were interviewed with the help of a pre-designed and pre-tested food frequency questionnaire. Data Analysis: Appropriate statistical measures were used. Results: Consumption of energy yielding foods such as rice, wheat, tubers, fats/oils and sugars were consumed by 98.2%, 99.5%, 98.5%, 99.5% and 79.7% subjects, respectively on regular basis. Regular consumption of milk or milk products was nearly half (52.6%). Meat, egg and fish were consumed by 74.1% subjects on irregular basis. The percentage of pulse consumption on irregular basis is also high (79.7%). Proportion of subjects who consumed fruits on irregular basis was 96.4% and only 19.1% subjects consumed green leafy vegetables regularly. Conclusion: Results of the study about the regular consumption of energy yielding foods and irregular consumption of body building and protective foods suggest the most accessible and not so accessible foods in their diet, respectively.

Key Words: Dietary diversity, Food Accessibility, Nutrient Adequacy, Women of reproductive age group.

Introduction

The United States Department of Agriculture (USDA) defines food insecurity as a situation of “limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways.” According to World Health Organization (WHO) there are three pillars that determine food security: food availability, food access, and food utilization. In 2009 Food and Agriculture Organization (FAO) added a fourth pillar: the ‘stability’ of the first three dimensions of food security over time.2

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Food access refers to the affordability and allocation of food, as well as the preferences of individuals and households. The causes of hunger and malnutrition are often not because of scarcity of food but an inability to access available food, usually due to poverty. Poverty can limit access to food, and can also increase vulnerability of an individual or household to food price spikes. Access depends on whether the household has enough income to purchase food at prevailing prices or has sufficient land and other resources to grow its own food. Households with enough resources can overcome unstable harvests and local food shortages and maintain their access to food.

In the global scenario one in three people are affected by malnutrition. An estimated 805 million people suffer from insecure food supplies, poor access to foods, and nutritionally inadequate diets. Almost 2 billion people suffer from micronutrient deficiencies - when the diet lacks essential vitamins and minerals required for proper growth and development, such as vitamin A, iron, zinc and calcium. A lack of available foods to constitute a diversified diet is a crucial factor for this. This is particularly the case in the developing world where diets often consist of starchy staples with not enough nutrient-rich sources of food, such as animal source foods, fruits, vegetables, beans and pulses. Diet quality is multidimensional; in addition to micronutrient adequacy, high-quality diets are characterized by balanced intake of protein, carbohydrates and fat and moderation in consumption of certain foods – those low in nutrient density and those associated with increased risks for chronic diseases.

Dietary diversity (DD) is defined as the number of different foods or food groups consumed over a given reference period. The household dietary diversity (HDD) is a proxy measure of household food access. To better reflect a quality diet, the number of different food groups consumed is calculated, rather than the number of different foods consumed. Historically, dietary quality has been used to refer to nutrient adequacy. From 391,000 known plant species, 5,538 are known to be used for human food. Just three – rice, wheat and maize – provide more than 50% of the world’s plant-derived calories. The actual per capita availability of food has decreased. A report states that “in almost a third of the countries for which data are available, production is estimated to have failed to keep up with growth of population.” In this connection women of reproductive age group are often nutritionally vulnerable because of the higher demands due to physiological conditions like pregnancy and lactation. The constitution of India as well as preamble of WHO, emphasized on raising health and nutritional status of women of reproductive age group. A normal healthy women gains about 12 kg in weight during pregnancy but poor rural Indian women on an average gain only 6.5 kgs so they are under nutritional stress and coupled with lactation, may lead to chronic under nutrition of mother and child both. In rural Indian context women may be smaller than men and usually eat in last the leftover of the food in the family while, they require a more nutrient-dense diet.

The growing concern in developed countries as well as in countries in transition regarding vulnerabilities and gaps in diet quality has been recognized for a long time. However, despite decades of appeals to improve women’s diet quality and nutrition, there has been little programmatic action. Promotion of diverse diets is one of several approaches to improve the nutrition of women of reproductive age group. Monotonous cereal-based diets that lack diversity
remains, a problem of food security in most developing countries particularly in India; ultimately leading to malnutrition in vulnerable groups. Therefore, the present study is an approach to measure the dietary diversity as a proxy indicator of food access.

**Objective:** Objective of this study was to assess the intra-household dietary diversity of rural women of reproductive age group to identify their accessibility to different food groups.

**Methodology**

**Study Area:** This study was conducted in Chiraigaon community development (CD) block of Varanasi district of Uttar Pradesh.

**Period of Study:** The study was carried out from April 2010–March 2011.

**Study Design:** A community based cross sectional study design was adopted for the study.

**Study subjects and sample size:** Women of reproductive age group (15–49 years) were considered for this study. Pregnant and seriously ill women were excluded. Computation of required sample size was based on the assumption that prevalence of chronic energy deficiency in the rural reproductive age group women is around 40% (NFHS-3)\(^16\), and sample size was fixed as 610.

**Sampling:** The required sample size was selected by adopting multi stage random sampling procedure. One block (viz. Chiraigaon) out of 8 CD blocks from rural Varanasi was selected randomly. Further five villages out of 84 revenue villages were selected by simple random sampling. Finally, from each village households were selected, only one eligible study subject from each household by using the probability proportionate to size (PPS) technique. In order to get required number of study subjects (610), systemic random sampling (every seventh household) was adopted.

**Tools and Techniques:** After taking the consent from the subjects, they were asked to recall the frequency of different foods consumed by them, in last 30 days; and it was recorded with the help of a pre-designed and pre-tested food frequency questionnaire (FFQ).

**Data Analysis:** Microsoft Excel 2007 and SPSS (version 16th) software were used to analyze the data. Appropriate statistical measures were applied for inferential purpose.

**Results**

Dietary diversity of study subjects is denoted according to the food groups categorized by their functions in the body i.e. providing energy, body building and growth and protection of body from infections and diseases. Foods rich in carbohydrate and fat are categorized as energy yielding food. In this category rice, wheat, tubers, fats/oils and sugars were consumed by 98.2%, 99.5%, 98.5%, 99.5% and 79.7% subjects, respectively, on regular basis. Contrary to this, 39.7% subjects never consumed other cereals like barley or millets whereas 60.3% subjects consumed it on irregular or occasional basis (Table-1).
Diversity of body building foods (rich in protein) such as milk or milk products was consumed by nearly half (52.6%) of the subjects on regular basis. Meat, egg and fish were consumed by 74.1% subjects on irregular basis. The pulses consumption on irregular basis was also high (66.6%). There were 4.9% subjects who never consumed milk or milk products in past 30 days. There were only 1.1% subjects who consumed non-vegetarian foods regularly (Figure: 1).

Under the category of protective foods (rich in vitamins and minerals), in case of 80.7% subjects, consumption of green leafy vegetables (GLVs) was irregular; only 19.1% subjects consumed GLVs regularly. Majority (96.4%) of the subjects consumed fruits on irregular basis, very small proportion of subjects (2.3%) consumed fruits regularly and 1.3% subjects never had fruits in their diet during past 30 days (Figure- 2).

Information regarding additional diversity of foods consumed by study subjects is given in table 2. Iodized salt was used by 93.6% subjects. In 67% subjects, mustard oil was exclusively used as cooking oil. In the family of majority (95.9%) subjects, sieved flour was used.

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**Table- 1:** Consumption of energy yielding foods.

<table>
<thead>
<tr>
<th>Food Items</th>
<th>Regular</th>
<th></th>
<th>Irregular</th>
<th></th>
<th>Never</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Rice</td>
<td>599</td>
<td>98.2</td>
<td>11</td>
<td>1.8</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Wheat</td>
<td>607</td>
<td>99.5</td>
<td>2</td>
<td>0.3</td>
<td>1</td>
<td>0.2</td>
</tr>
<tr>
<td>Other Cereals: Barley/ Millets</td>
<td>00</td>
<td>0.0</td>
<td>368</td>
<td>60.3</td>
<td>242</td>
<td>39.7</td>
</tr>
<tr>
<td>Roots &amp; Tuber</td>
<td>601</td>
<td>98.5</td>
<td>9</td>
<td>1.5</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Fats &amp; Oils</td>
<td>607</td>
<td>99.5</td>
<td>1</td>
<td>0.2</td>
<td>2</td>
<td>0.3</td>
</tr>
<tr>
<td>Sugar &amp; Jaggery</td>
<td>406</td>
<td>79.7</td>
<td>124</td>
<td>20.3</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

**Figure- 1:** Consumption of body building food.

Under the category of protective foods (rich in vitamins and minerals), in case of 80.7% subjects, consumption of green leafy vegetables (GLVs) was irregular; only 19.1% subjects consumed GLVs regularly. Majority (96.4%) of the subjects consumed fruits on irregular basis, very small proportion of subjects (2.3%) consumed fruits regularly and 1.3% subjects never had fruits in their diet during past 30 days (Figure- 2).

Information regarding additional diversity of foods consumed by study subjects is given in table 2. Iodized salt was used by 93.6% subjects. In 67% subjects, mustard oil was exclusively used as cooking oil. In the family of majority (95.9%) subjects, sieved flour was used.
Figure- 2: Consumption of protective food.

Table- 2: Additional diversity of foods consumed by study subjects.

<table>
<thead>
<tr>
<th>Particulars (N=610)</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of salt used</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refined Iodized</td>
<td>571</td>
<td>93.6</td>
</tr>
<tr>
<td>Crystalline Non-Iodized</td>
<td>39</td>
<td>6.4</td>
</tr>
<tr>
<td><strong>Type of oil/ fat used</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mustard oil</td>
<td>409</td>
<td>67.0</td>
</tr>
<tr>
<td>Refined oil</td>
<td>20</td>
<td>3.3</td>
</tr>
<tr>
<td>Vanaspati</td>
<td>9</td>
<td>1.5</td>
</tr>
<tr>
<td>Deshi Ghee</td>
<td>5</td>
<td>0.8</td>
</tr>
<tr>
<td>Two of them</td>
<td>107</td>
<td>17.5</td>
</tr>
<tr>
<td>Three of them</td>
<td>50</td>
<td>8.2</td>
</tr>
<tr>
<td>All</td>
<td>10</td>
<td>1.6</td>
</tr>
<tr>
<td><strong>Type of flour used</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sieved (without Choker)</td>
<td>585</td>
<td>95.9</td>
</tr>
<tr>
<td>Unsieved (with Choker)</td>
<td>25</td>
<td>4.1</td>
</tr>
</tbody>
</table>

Discussion

The results provided by the food frequency method clearly reflect that there has been deficiency in the dietary pattern of women of reproductive age group in the study area on qualitative scale. National Nutrition Monitoring Bureau has also pointed out that in the past three decades diets continue to be cereal based and monotonous. Among poorer segments consumption of fruits, vegetables and animal foods continue to be low. There has been progressive reduction in pulse intake, small increases in fats oil in urban slums and increase in DD among rural higher income group. Khetarpal reported that only 10% of women consume balanced diet; he also reported low intake of vegetables fruits and milk products.
Various studies on DD confirmed the findings of the present study reporting, "wheat as the 'main cereal'." Nutritious millets were once a strong part of traditional diets in Southern India before agricultural subsidies shifted attention to rice, wheat and maize and they became a 'forgotten food'. India's National Food Security Act (2013) is incorporating millets into the public distribution system, meaning thereby that these nutritious grains are now available to more than 800 million people at a subsidized rate. Another focus is to improve market links for small-scale producers such as restaurants adding millet-based dishes to the menu, and the addition of millets in school lunches in 12 districts in Central and South India. Deshi ghee consumption was practically nonexistent in the present study and contrary to this, Mittal reported that Deshi ghee was consumed in good amount in almost every food preparation of rural Himalayan region. A study conducted by Pant in Himalayan region, reported lower consumption of pulses on daily basis (5.15%) than the present study (32.1%). Even the consumption of GLVs on the daily basis was more (19.19%) in the present observation than the study conducted in Himalayan region (1.47%).

According to a report non vegetarian food (meat and egg) were rarely eaten by women. The findings obtained through FFQ method, highlight qualitative deficiencies in the diet of study subjects.

There are several constraints to food security of women. It can be constrained physically or more frequently economically due to the gendered role of women. These constraints are interrelated. Household decision making models based on common utility function fail to explain dynamics impacting intra household resource, location & food distribution. Inequalities are more predominant in Sub-Saharan Africa and Burkino Faso primarily due to prevailing polygamy. Gender discrimination has been observed in Bangladesh. Global Food Policy initiatives concentrated mainly on small scale women cantered agricultural co-operatives.

Accommodation of gender in agriculture is crucial for development policies, World Bank realizes that women make up more than 50% of labour force and are involved in three quarters of food production in several countries. FAO focuses on increased investment, productivity enhancing mechanisms and better infrastructure to enable women to engage in more productive activities and emphasizes on pushing women's agendas into the public sphere and discouraging the spread of gender inequality onto the future generation.

FAO has also emphasized on more enhanced spending on women's specific interventions and considered women empowerment in agricultural index to evaluate goals. The first millennium development goal refers to eradication of extreme hunger and poverty. Its focus is on food security challenges. FAO's 'twin track' approach to fight food insecurity combines sustainable development and short term hunger relief. In fact approaches for addressing food insecurity should be human right based, target the poor, promote gender equity, enhance long term resilience and allow sustainable graduation out of poverty. Food for work programme seeks to improve nutrition and quality of life to the most vulnerable populations and promote self reliance. United States Agency for International Development has proposed several steps to increase agricultural productivity securing, property rights, enhancing human capital through education and improved health, good governance, accountability and transparency in public institutions.
In India based on the decision of National Development Council, National Food Security Mission was launched from 2007-08. In spite of significant progress on agricultural front there has been persistent existence of food insecurity in India due to existence of poverty, lack of effective targeting of public distribution system coupled with ignorance of the public at large. It is surprising that in spite of adequate food availability and accessibility at household, there has been food inadequacy at individual level. It is not uncommon to find that individual food security prevailed in spite of the existence of food insecurity at household level. Findings of the present study support this observation.

Conclusion

Dietary diversity is a qualitative measure of food consumption that reflects household access to a variety of foods, and is also a proxy for nutrient adequacy of the diet of individuals. Result of this study gives an insight into food accessibility of women of reproductive age group which was far from being satisfactory. Regular consumption of rice, wheat, tubers and fats and oils by the study subjects was almost universal. Consumption of protective foods (fruits and GLVs) and body building foods was irregular in subjects. Therefore it can be concluded that the diversity of their diet is basically restricted to the fulfillment of their daily energy requirement only. The evidences suggest that household-level dietary diversity could be a useful indicator of food accessibility. Hence, these study further need to explore on factors responsible for low/high level of dietary diversity as well.

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