Nutritional Status of Children in Slums of Dhaka, Bangladesh

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Abstract

The nutritional status of children in slums of Dhaka is a sensitive indicator of health, economy and the sustainable development of Bangladesh. The research highlights the consequence of anthropometric measurements and nutritional status related other issues are taken of 102 children. The survey with a structured questionnaire was conducted by the researcher during 15th April 2015 to 6th June, 2015 among 102 children aged between 2 to 12 years from Mirpur, Kuril and Kamalapur slums (N=102) in Dhaka city. To determine hypothesis statistical data analysis QtiPlot and MS Excel software tools were used and hypothesis was tested. Bi-variant and analyses were used to determine the nutritional status of children and identify the relationship of common factors with the nutritional status of children. The research presents a number of results, 33.5% of the children age between 2 to 12 years are suffering from malnutrition. According to the BMI results, 32% of the children have undernourished problem. The socio-economic status of the children is pitable. The children families mean monthly household incomes are affecting their health and nutritional status. The study reveals that 76.4% of the children are suffering from diseases for last one month because of their sanitation and hygiene status. The research also highlights the nutritional status of the children influenced by their parents awareness, socio-economic and demographic condition, nutrient intake, breastfeeding practice, good hygiene practice, sanitation system. Malnutrition along with high morbidity rates, this action may occur the children from their future unexpected problem during motherhood and hamper cognitive development. Nutritional education programs need to be implemented to improve the nutritional status. The present study generates information which indicates that the nutritional status of the children should not be overlooked and suitable approaches designed to improve their nutrition should be considered and studies elaborately in the future.

Keywords: Slums; Malnutrition; Nutritional status; Food intake; Hygiene and sanitation

Introduction

Bangladesh is the ninth most populous countries in the world [1], 1,203 persons per sq. km are living in Bangladesh [2] and Dhaka the capital of Bangladesh, one of the most densely populated cities in the world [3]. The population in slums of Dhaka city is increasing at an alarming rate due to migration by the rural poor. Slums are the spatial symptoms of urban poverty, social exclusion, and improper government policies [4]. Almost 28% people of Dhaka city are living in the slums under very miserable condition [5] and most of them are undernourished, illiterate and do not have knowledge about the nutritional value of foods [6]. Due to poor sanitation and congested living with 4 to 5 people, they often suffer from diseases like diarrhea, dysentery, typhoid, dengue and pneumonia [7]. Specially, children who are naturally innocent, vulnerable, and dependent often suffering from malnutrition [8]. The nutritional status of these children is an alert sign of the country’s health, sustainable nutrition and economy. Malnutrition of children is a serious problem in slums of Dhaka [9]. Malnutrition is one kind of situation in which long-lasting lack of one or more nutrients retards physical development or causes specific clinical disorders, e.g., low birth weight, wasting, stunting, underweight, vitamin A deficiency, iodine deficiency disorder, iron deficiency anemia, etc... [10]. Bangladesh is one of the countries with the highest rate of children malnutrition [11] and up to 40% of children under the age of 5 years are suffering from chronic malnutrition [12] and malnutrition rate of children in slums is even worse [13]. Protein-energy malnutrition, iron deficiency anemia, iodine deficiency disorders, and vitamin A deficiency are common for children in the slums of Dhaka city [14] and the main reasons for that their poor social, economic and demographic conditions, including family income, assets, morbidity, employment, total household expenditure, mother’s education, social networks, hygiene and sanitation and consumption knowledge [7,15]. One of the ICDDBR’s Centre for Nutrition & Food Security baseline survey in Bangladesh showed that under nutrition is high among young children, 41% of children were found stunted, 33% underweight and 11% wasting [16].

Research aim and objectives

The research carried out to assess the nutritional status of under the age of 2 to 12 years children in slums of Dhaka city. The associated major objectives include:

- To find out the nutritional status of the children through anthropometric measurements and dietary assessment.
- To find out the demographics and socio-economical characteristic of the study children.
- To determine the health, and sanitation condition of the children.

Materials and Methods

Research site

In this research, Mirpur slum of Mirpur Thana, Kamalapur slum of

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Motijheel Thana and Kuril slum of Badda Thana in Dhaka district have been chosen for the survey.

Research design a survey was carried out among 102 children of Dhaka slums age between 2 to 12 years during April to June, 2015 with format permission from the local authority and by taking informal consent. It was a cross-sectional survey and divided into three clusters (Mirpur, Kuril and Kamalapur slums) in Dhaka city. Dietary data, socioeconomic, demographic, disease variables and anthropometric data - height, weight and BMI was collected by using a structural questionnaire and nutritional status assessed. The research has been conducted in two steps.

Firstly, the necessary data has been extracted from anthropometric cross-sectional health survey and each child gave a sample of food frequency.

Secondly, the extracted data has been assessed and compared with certain standards by analyzing specific contents.

Data collection

Data collection is the process of gathering information. The data collection process of this study was a primary research (field research). Total 102 children (respondents) have been selected from three different slums in Dhaka city and samples had been taken from these three clusters (slums) by using the questionnaire and made the interviews. Random sampling technique was used for data collection. Random Sampling is a probability sampling method, starting point is determined randomly and from then on the systematically each nth element is drawn [17]. The children’s own mother language Bengali had been used during data collection.

Data analysis

For data analysis an important first step is summarizes and display of the data [18]. In the current research, data were edited. Editing involves carefully checking survey data for completeness, legibility, consistency, and accuracy. The collected data were evaluated, categorized, grouped and interpreted aiming at the objectives of the study. Then, the relevant data processed and analyzed by using statistical software QtPlot and Microsoft excel. In quantitative research, tables and graphs are used to display data and convey meaning in the analysis [19].

Table 1 illustrates that the mean height of the children (cm) are 109.72 ± 5.6, weight (kg) was 15.83 ± 9.4 and Mean Body Mass Index (BMI) (kg/m2) are 15.74 ± 3.5. Mean BMI is 15.74 which is acceptable but not enough because 32% children are under nourished.

<table>
<thead>
<tr>
<th>Age Group (years)</th>
<th>N (%)</th>
<th>BMI Normal (14.5-21.5) N (%)</th>
<th>Overweight (21.5+) N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-3</td>
<td>49</td>
<td>18 (36.72)</td>
<td>29 (59.20)</td>
</tr>
<tr>
<td>6-9</td>
<td>33</td>
<td>09 (27.27)</td>
<td>24 (72.73)</td>
</tr>
<tr>
<td>10-12</td>
<td>20</td>
<td>05 (25.00)</td>
<td>15 (75.00)</td>
</tr>
<tr>
<td>Total</td>
<td>102</td>
<td>32 (31.8%)</td>
<td>36 (35.8%)</td>
</tr>
</tbody>
</table>

Source: (author’s own construction and calculation according to own data source).

Table 2: Distribution of the children’s by age group with related to Body Mass Index (BMI) (aged 2 to 12 years) (N=102).

Figure 1: Distribution of the children’s by monthly household income (N=102).

<table>
<thead>
<tr>
<th>Per capita income (BDT)</th>
<th>N (%)</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,000-5,000</td>
<td>6</td>
<td>62%</td>
</tr>
<tr>
<td>5,000-8,000</td>
<td>33</td>
<td>32%</td>
</tr>
<tr>
<td>8,000-12,000</td>
<td>63</td>
<td>6%</td>
</tr>
</tbody>
</table>

Source: (author’s own construction and calculation according to own data source).

Table 3: Distribution of the children’s by monthly household income with related to nutritional status/BMI (N=102).
energy, 18 ± 10 g protein, 14 ± 8.5 g fat and 175 ± 46 g CHO. On the other hand, 32 children are undernourished and their BMI are below 14.5. They consumed 874 ± 325 kcal energy, 14.5 ± 9 g protein, 12.5 ± 9 g fat and 113 ± 58 g CHO.

Table 11 reveals that current energy intake reduced by 60.60 kcal as compared with icddr’b-2010 national survey. But compared to the WHO-2000 and WFP-2008 survey with the current research, the energy intake is slightly increased. The energy intake ratio of the children is fluctuated but not big margin the table shown. On the other hand, the current, Bangladesh study shows that protein intake

<table>
<thead>
<tr>
<th>No. of Children</th>
<th>Mean calorie intake (kcal)</th>
<th>Mean Protein intake (g)</th>
<th>Mean iron intake (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>986.86</td>
<td>13.92</td>
<td>5.002</td>
</tr>
<tr>
<td>33</td>
<td>1029.75</td>
<td>16.87</td>
<td>6.106</td>
</tr>
<tr>
<td>63</td>
<td>1102.48</td>
<td>18.84</td>
<td>6.018</td>
</tr>
<tr>
<td>102</td>
<td>1039.4</td>
<td>16.55</td>
<td>5.7</td>
</tr>
</tbody>
</table>

Source: (author’s own construction; the data was calculated on the basis of WHO/FAO technical committee guidelines for children’s data).

Table 4: Relationship between per capita income and nutrient intake (N=102).

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>St. D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height (cm)</td>
<td>81.28</td>
<td>147.32</td>
<td>109.72 ± 5.6</td>
<td></td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>11</td>
<td>30</td>
<td>15.83 ± 9.4</td>
<td></td>
</tr>
<tr>
<td>BMI (kg/m2)</td>
<td>11.44</td>
<td>18.16</td>
<td>15.74 ± 3.5</td>
<td></td>
</tr>
</tbody>
</table>

Source: (author’s own construction and calculation according to own data).

Table 5: Anthropometric characteristic of the children (N= 102) (aged 2 to 12 years).

<table>
<thead>
<tr>
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<th>Mean</th>
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<td></td>
</tr>
</tbody>
</table>

Source: (author’s own construction and calculation according to own data source).

Table 7: Mean per capita nutrient intake by food sources (N=102).

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>Mean per capita intake</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cal. intake (kcal)</td>
<td>1039.4</td>
</tr>
<tr>
<td>Protein (g)</td>
<td>16.55</td>
</tr>
<tr>
<td>Fat from foods (g)</td>
<td>14.11</td>
</tr>
<tr>
<td>Carbohydrate (g)</td>
<td>139.53</td>
</tr>
<tr>
<td>Vitamin C (mg)</td>
<td>22.72</td>
</tr>
<tr>
<td>Iron (mg)</td>
<td>5.7</td>
</tr>
<tr>
<td>Calcium (mg)</td>
<td>407.75</td>
</tr>
</tbody>
</table>

Source: (author’s own construction; data calculation on the basis of FAO-Infants, children, and adolescents energy, protein and micronutrients requirement data).

Table 8: Distribution of the children’s by their mean energy intake per day (N=102).

<table>
<thead>
<tr>
<th>No. of Children N (%)</th>
<th>Mean energy requirement/day (kcal)</th>
<th>Mean energy intake/day (kcal)</th>
<th>Mean energy balance/day (kcal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-5</td>
<td>49 (48.039)</td>
<td>1150</td>
<td>958.26</td>
</tr>
<tr>
<td>6-9</td>
<td>33 (32.352)</td>
<td>1300</td>
<td>1047.4</td>
</tr>
<tr>
<td>10-12</td>
<td>20 (19.607)</td>
<td>1500</td>
<td>1112.4</td>
</tr>
</tbody>
</table>

Source: (author’s own construction; the data was calculation on the basis of WHO/FAO data).

Table 9: Per capita energy and nutrient intake and mean percentage fulfillment of the requirement (N=102).
The nutritional status of the slums children is a sensitive indicator of the country’s health, sustainable nutrition and economy. This decreased gradually and it is 16.6 g/day but 15 years before it was 26 g/day.

Figure 2 illustrates that total 78 children are suffering from diseases from last one month which is 76.4% of the total children.

Table 12 indicates that the relation of the health issues like morbidity pattern with using water, human waste disposal and household waste disposal status of the children. 75% of the children are suffering from disease and it is related with the types of drinking water. On the other hand, 79% of the children are suffering from disease with related to household used water. Similarly, 75% and 80% children’s disease also related with human waste disposal and household waste disposal respectively.

Discussion

The nutritional status of the slums children is a sensitive indicator of the country’s health, sustainable nutrition and economy. This

<table>
<thead>
<tr>
<th>BMI</th>
<th>Num. of children</th>
<th>Energy (kcal)</th>
<th>Protein (gm)</th>
<th>Fat (gm)</th>
<th>CHO (gm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;14.5</td>
<td>32</td>
<td>874 ± 325</td>
<td>14.5 ± 9</td>
<td>12.5 ± 9</td>
<td>113 ± 58</td>
</tr>
<tr>
<td>14.5-21.5</td>
<td>68</td>
<td>1040 ± 319</td>
<td>18 ± 10</td>
<td>14 ± 8.5</td>
<td>175 ± 46</td>
</tr>
<tr>
<td>21.5+</td>
<td>2</td>
<td>1204 ± 41</td>
<td>17 ± 1</td>
<td>16 ± 1.5</td>
<td>131 ± 11</td>
</tr>
</tbody>
</table>

Source: (author’s own construction and calculation according to own data source).

Table 11: Comparison of per capita energy and protein intake of the children’s with current study’s data).

Table 10: Distribution of subjects by Body Mass Index and nutrient intake (N=102).

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>WHO-2000</th>
<th>WFP-2008</th>
<th>ICDDR’B-2010</th>
<th>Current study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy(kcal)</td>
<td>1020</td>
<td>1007</td>
<td>1100</td>
<td>1039.4</td>
</tr>
<tr>
<td>Protein(g)</td>
<td>26</td>
<td>22</td>
<td>19.5</td>
<td>16.6</td>
</tr>
</tbody>
</table>

Source: (author’s own construction; comparison with WHO, WFP, ICDDR’B and current study’s data).

Table 14 shows that the types of human and household waste disposal of the children. 50% family are disposing their human waste near outside the house, 35% of the children with family disposing human waste far away outside the house and 15% of the children and their family disposing human waste near outside the house & far away outside the house both. On the other hand, 59% of the family is disposing their household waste near outside the house, 26% are disposing household waste far away outside the house and 13% are disposing household waste near outside the house & far away outside the house both. Only 2% of the children’s family found they put household waste inside the house.

Figure 4 illustrates that the types of latrine children using for human waste disposal. Here the figure shows that 59% of the children are using non-sanitary latrine and 33% are using sanitary latrine. On the other hand, 8% children use sewer (open drain).

Table 15 indicates that the relation of the health issues like morbidity pattern with using water, human waste disposal and household waste disposal status of the children. 75% of the children are suffering from disease and it is related with the types of drinking water. On the other hand, 79% of the children are suffering from disease with related to household used water. Similarly, 75% and 80% children’s disease also related with human waste disposal and household waste disposal respectively.
present study reveals that children aged between 2-5 years are found 48% (Table 1), almost half of the total study children which is very sensitive age group of the children’s whole life. Because, 2-5 years of children are suffering from malnutrition more (36.72%) than the other two groups of children in slums of Dhaka (see Table 2). According to the WFP-2009, malnourished children are birth to 5 years old at high risk of morbidity and mortality rate. Current research reveals that cereal food groups, especially rice has eaten daily (20-21 times/week) by 96.07% of the children. Therefore, malnutrition is a serious problem of children in slums of Dhaka [9]. According to the Child Nutrition Survey of Bangladesh 1990-2005, during 1990 to 2005, the prevalence of underweight was reduced by 25.2 percentage points which was from 70.9% to 45.7% and stunting by 29.1 percentage points from 68.3% to 39.2%. It was a significant reduction and the survey expected that Bangladesh achieves the target of reducing underweight prevalence to 32.9% in 2015. Another survey conducted by Bangladesh Bureau of Statistics (BBS) (MICS 2012-13) and according the BBS survey and WHO 2005 growth reference standards, almost 33% of children aged in between birth to 6 years were undernourished in Bangladesh. The World Health Organization illustrated that the undernourished rate was “very high”, and the prevalence of wasting point out a “critical problem” in Bangladesh [20]. In Dhaka division the nutritional status of children had the lowest prevalence of wasting which was 9.7% but when it made ratio with slums children it was more than 9.7% (WHO, 2005). The current study indicates that the mean Body Mass Index (BMI) (kg/m2) of the children is 15.74 ± 3.5. Mean BMI are 15.74 which is acceptable but not enough because 32% of the children’s BMI are under nourished (<14.5) (see Table 2). The study also shows that 33.5% of the children under the age between 2 to 12 years are suffering from malnutrition because of the total percentages of nutrients fulfillment per day is lower than Recommended Dietary Allowances (RDA) set by the relevant national and international body including ICDDR'B, Bangladesh, National Nutrition Council (NNC), Bangladesh, WHO and FAO for children. This prevalence of percentage comes from seven individual essential nutrients of foods such as energy 76%, protein 68%, fat 52%, iron 69%, calcium 43% and CHO 76% mean fulfillment per day (see Table 9).

On the other hand, the present study illustrates that the socio-economic status of the slums children in Dhaka are lower than other groups of the Dhaka city and the families mean monthly household income 6833.33 BDT when the whole country’s per capita mean monthly income was 8869.50 BDT (1314 US Dollars/year) (bdnews

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**Table 13:** Distribution of the source of water using the children’s family per day (total children’s family 54 and number of children’s 102) (N=54).

**Table 14:** Distribution of the human waste and household waste disposal status of the children’s family (total children’s family 54 and number of children’s 102) (N=54).

**Table 15:** Relationship between morbidity patterns and using water, human waste disposal and household waste disposal status (N=102).

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**Figure 4:** Distribution of the types of latrine children’s have used for human waste disposal (N=102).

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are using sewer (open drain) which is very harmful for environment which is 59% whereas 33% are using sanitary latrine. But 8% children that almost two-third of the children are using non-sanitary latrine much dirty and it is not permitted for using. The current study shows 11% of the children’s family is using cannel/river’s water which is so using supply & tube wall water both for drinking. On the other hand, 78% of the children family are using tube wall water and 31% family are that 41% children’s family are using supply water for drinking and 28% of drinking water in Bangladesh and 94.4% of household use supply and tube wall water respectively.

Overall, in this study find out that one-third of the total children are suffering from malnutrition because of their lack of nutrients intake, BMI is poor than the standard references and their pitiable socio-economical, demographical condition as well as poor sanitation and lack of hygiene practice affecting nutritional status of the slum children in Dhaka, Bangladesh.

The report of Child Nutrition Survey 2005, published by Bangladesh Bureau of Statistics, the prevalence of underweight was reported to 39.7% whereas the present study says that it is 31.8% undernourished in Slums of Dhaka city. Malnourished children are at high risk of morbidity and mortality [23]. Morbidity such as diarrheal disease, upper respiratory infections, and blindness, skin disease can significantly reduce if children use safe water, proper sanitation and hygienic disposal of human waste (Health, Population and Nutrition Sector Development Program, 2011-16). The present study shows that 76.4% of the children are suffering from diseases of last one month including 20%, 31% and 12% of the children are suffering from diarrhea, fever and skin diseases respectively (see Figures 2 and 3) and these are the common issues for children in slums of Bangladesh.

The present study indicates that there are a big relationship between the morbidity patterns (last one month) of the children related with BMI and 91% of undernourished children are suffering from any sort of diseases whereas 72% of the BMI normal children are suffering from any sort of diseases last one month (see Table 12). The research shows that the underweight children’s morbidity rate higher than the other BMI group children. But there is no significant difference found between BMI and the morbidity pattern of the children. According to the table 15, there are a co-relationship found between morbidity patterns and using water, human waste disposal and household waste disposal status of the children. The NHDSBD survey-2011 indicated that tube wall water and supply water are the most common sources of drinking water in Bangladesh and 94.4% of household use supply or tube well water as drinking water [24]. The present study illustrates that 41% children’s family are using supply water for drinking and 28% of the children’s family are using tube wall water and 31% family are using supply & tube wall water both for drinking. On the other hand, 11% of the children’s family is using cannel/river’s water which is so much dirty and it is not permitted for using. The current study shows that almost two-third of the children are using non-sanitary latrine which is 59% whereas 33% are using sanitary latrine. But 8% children are using sewer (open drain) which is very harmful for environment as well as children’s health (see Figure 4). Table 15 indicates that the relationship between morbidity patterns and using water, human waste disposal and household waste disposal status of the children. According to Table 15, 75% children suffered from disease with related to types of drinking water. On the other hand, 79% of the children suffered from disease with related to household used water. Similarly, 75% and 80% children’s disease also related with human waste disposal and household waste disposal respectively.

Overall, in this study find out that one-third of the total children are suffering from malnutrition because of their lack of nutrients intake, BMI is poor than the standard references and their pitiable socio-economical, demographical condition as well as poor sanitation and lack of hygiene practice affecting nutritional status of the slum children in Dhaka, Bangladesh.

The nutritional status of the slum children are more than average in Bangladesh but they lack in nutrient intake food along with physical activities and morbidity rate, this action may occur these children from their future unexpected problem during motherhood and hamper the cognitive development. Nutrition education programs need to be implemented to improve the nutritional status. The present study has generated information which indicates that the nutritional status of this group should not be overlooked and suitable approaches designed to improve their nutrition should be considered. It should studies elaborately in future. Depending on the findings, however a set of recommendation has been made for the improvement of their nutritional status.

Primary focus on nutrition promotion, and the central role of the school

Health promoting schools may provide an appropriate framework for enhancing nutrition among children, at least for those who are in school. School-based programs may also encourage children to remain in school, e.g., school-feeding programs. This is particularly important for children. Community-based institutions e.g., youth groups, community clinic, local NGOs can also be involved, in addition to using media [25].

Prevention and management of nutritional problems and risks

Health care providers can deal most directly, and primarily with micronutrient deficiencies, malnutrition of the children’s.

Nutritional assessment

Nutritional assessment should be an inherent part of preventive health care services to children. This includes anthropometry could even be regularly measured in schools or if possible in house by the Government body or NGOs [26].

Provide hygiene and health related knowledge

Hygiene and health related proper knowledge should be provided and developed by the Government body or national and international NGOs. Because the study children’s morbidity rate is very high and hygienic practice is too poor. One of the important things is that their using drinking and household water should be changed [27].

Control of diarrheal diseases

Issues regarding implementation of micronutrient malnutrition as
well as diarrheal diseases control programs are only partially addressed. Higher allocation of resources needs to be made to improve the outreach of health care delivery.

Control of micronutrient deficiencies

Iron deficiency anemia need to be controlled and prevented in children. Iron deficiency is the predominant cause of anemia, and correcting it is an investment in adult productive and reproductive lives. Multiple mineral vitamin supplementations to correct the problem could be done for little cost. Providing free or price-subsidized micronutrient fortified food during school hours would be a further step towards improving their nutritional status. Young children’s are ideal targets for food-based approaches to improving micronutrient status, in particular vitamin A and iron [29].

Improve socio-economic and environmental condition

High socioeconomic and good environmental conditions are the most important factors associated with lower prevalence of malnutrition. The Government and the associated stockholders should be taken the proper steps for improving their socio-economic and environmental status.

To start community nutrition program

Community nutrition is a branch of human nutrition focuses on serving all people, especially in children and to meet their food and nutrition. Also needs to improve or maintain in a healthy state, through all stages of life of the children.

Perceptions and knowledge

A concentrated approach to improve awareness among all regarding the importance of nutrition for children is likely to be very useful and breastfeeding practices should be encourage among the lactating mothers. Gender discriminations should be eliminated from the society through awareness rising to ensure intra-household food security.

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