Research Article

House Hold Members Knowledge and Practice on Food from Animal Sources for Under Two Years Old Children in Alive & Thrive Areas of Bangladesh

Umme Salma Mukta and Umme Sayka

Abstract

Introduction

Rice is consumed as main staple food in Bangladesh by the two-third of the total population especially the poor, adding with some vegetables, pulses and small amount of fish, meat, egg, milk etc if and when available. In the Alive and Thrive (A&T) intervention areas in spite of counseling on feed from animal sources still found lower practices. Research and evaluation division (RED) of Bangladesh Rural Advisements Committee (BRAC) initiated a research to address the issues and to increase the consumption from animal sources to among the children.

Objective

The objectives of the study were to explore the knowledge and practice on food from animal sources among the children aged 6-23 months in A&T intervention areas.

Methods

Mixed methods design for the research was choosing to find comprehensive information in 12 upazilas of Borguna, Sylhet, Chittagong and Dinajpur districts, 8 upazilas selected from the intervention areas and 4 from the control areas where the A&T not supported. The information was collected from mainly the PKs, SSs, mothers/caregivers and other programme staffs.

Results

The study revealed that the knowledge and practice for consumed from animal sources was very low. Also the common barriers of consumption from animal sources were financial crisis, lack of knowledge, lack of awareness on protein deficiency, barriers from the family members; unavailable of the products in near local market, etc.

Conclusion

Apparently it can say that, consumptions from animal sources for the under two years children might be increased by reducing the barriers and more input to increase the knowledge as well as practices.

Keywords: Infant & Young Child Feeding (IYCF); Animal Sources; Knowledge; Practices; Bangladesh

Background

Nutrition is a basic human need and prerequisite to a healthy life. A proper diet is essential from the very early stages of life for proper growth, development and to remain active. Food consumption, which to a large extent depends on production, access, distribution and affordability, impacts on the health and nutritional status of the population. Although Bangladesh has made considerable progress in increasing national level food availability, the intake of energy and other essential nutrients are still below the requirements and recommended dietary allowances. Diets are largely imbalanced with the staple food cereals contributing around 70% of total energy intake [1].

A popular conviction is considering quality and utilization proteins from animal foods are simply somewhat superior to the plant foods. Animal source foods provide a variety of important nutrients not easily obtained from plant foods, particularly lysine, bio-available iron and zinc [2]. Meat, however, can play a key role in preventing iron-deficiency anemia, which is common in low-income countries and certain populations in middle and high-income countries. Literature review shows that an estimated 6% of under-five deaths can be prevented by ensuring optimal complementary feeding [3]. Therefore, it is crucial to explore the reason behind this low consumption rate of animal protein among the children in the A&T intervention areas. Gaps might be present in-terms of knowledge and perception of the mothers or the volunteers delivering the interventions, or might be other way...

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around, for instance, the financial insufficiency of the households to buy animal food etc. And from the animal sources high rich of protein can be consumed.

Proteins are mostly containing of nitrogen substances which produced from amino acids. These acids mainly worked as the major structural component of muscle and other tissues in Proteins to the body. They also help to produce hormones, enzymes and hemoglobin, energy; however, for energy sources it’s not the prime mover [4]. The deficiency of protein mainly linked to malnutrition, stunting and so on [5]. Deficiency of protein develops chronic under nutrition and affects the children most in achieving the normal growth and development [5]. It is crucial to explore the reasons behind the low consumption from animal sources in the programme areas.

Average daily per capita calorie intake was estimated at 2675 kcal where Carbohydrates contributed to approximately 80% of the total calorie consumption including protein and fat contributed to 10% each. But energy intake from carbohydrate that was fulfilled by the households was deficient in protein and fat intake [6,7].

Fish, especially small fish, is the most important animal food in the Bangladeshi diet which is supplying animal protein and micronutrients with high bioavailability [7,8]. Healthy diets are said to be those that are most varied [9,10]. A more diversified diet is an important outcome by itself. It is estimated that a more diversified diet is associated with a number of improved outcomes in areas such as birth weight, child anthropometric status, and improved hemoglobin concentrations [11].

Inappropriate dietary diversity is particularly severe problem among poor populations from developing world because their diets are predominately based on starchy staples and often include little or no animal products and few fresh fruits and vegetables. These plant based diet tend to be low in micronutrients, and the micronutrients they contain are often in a form that is not easily absorbed [12,13]. It was reported that the consumption of animal protein remain low in the programme areas. Which need to find out the reasons lies behind it to find efficient intervention strategy for the programme to increase the intake of animal protein most. Considering that BRAC RED conducted a study on the animal protein consumption especially among children under 2 years in A&T catchments areas where they emphasized on animal protein most for complementary feeding part among infant and young child feeding (ITCF) services.

Research Question
What are the statuses of animal food consumption among children under two years old?

Objective
1. To assess the uses of overall knowledge and practices on complementary food intake.
2. To identify the consumption on appropriate complementary food especially the animal protein.
3. To find out the possible interventional vehicle for programme.

Methodology
Study Design
It was a mixed method study in design, conducted in 12 upazilas from 4 districts. To conduct the study it was needed tentative 6 months. Each district contains of one control and two intervention upazilas.

Table 1: Area of distribution

| District (n=4)   | Intervention Upazilla (n=8) | Control Upazilla |
|-----------------|-----------------------------|------------------|
| Sylhet          | Balagong, Baniabor          | Golapgonj        |
| Dinajpur        | Birol, Nowbabgong           | Birgong          |
| Chittagong      | Satkania, Lohagora          | Pattiya          |
| Borguna         | Balaganj, Sadar             | Amtoli           |

Study Population
For the study mainly the Shasthya Shebika (SSs), Pusti Kormi (PKs) and mothers having under two years children, were selected. In addition to them Upazila Manager (UM), Branch Manager (BM), Program organizer (PO), Shasthya Kormi (SK) were selected to know their point of view on the matter. The other main respondents for the study were mothers or care givers to know their point of view about the matter and to find the reasons.

Participant Eligibility
Inclusion Criteria: Who were enrolled in the A&T and/or other BRAC programme.

Exclusion Criteria: Who were visibly ill, uncomfortably to participate were excluded.

Sample Size and Sampling Procedure: Mothers (10 from each SS catchment areas) were randomly selected from the intervention (n=800) and control (n=400) areas. Socio-economic status of each household was gathered and the total study population was 6207 where 4129 and 2078 household members were from intervention and control areas. For the quantitative part the sample size were-

Table 2: Quantitative sampling procedure

| Intervention areas (n=8 uz) N= 880 | Control areas (n=4 uz) N= 440 |
|-----------------------------------|-------------------------------|
| Ss (8x10=80) 80                   | Ss (4x10=40) 40              |
| Mothers (80x10=800) 800           | Mothers (40x10=400) 400      |

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For the qualitative part the sample size were-
Tools of the Study: A pre tested structured questionnaire was used for the quantitative parts and semi-structured questionnaire designed (for in depth interview, informal discussion and Focus group discussion) for the qualitative part. During the preliminary phase of the study, qualitative information was collected through the following three methods:

1. **In-depth interview**
2. **Focus group discussion**
3. **Informal Discussion**

**In-Depth Interview:**

**Areas to Cover, But Not Restricted To:**
- Socio-economic status of key informant
- Service delivery by SS and PK in their catchment Households (HHs)
- Knowledge, perception and practices on animal food consumption
- Perceived barriers on animal food consumption and coping mechanisms
- Unmet need to increase the animal consumption, if any

Guidelines for in-depth interview was developed and finalized after pre test. Trained anthropologists were carrying out interview with pre-selected SS, PK and mothers to know their perception on the functioning and services by the A&T service provider.

**Focus Group Discussion (FGD):**

**Areas to Cover:**
- Socio-economic status of the respondents
- Influence factors to consumption animal food
- Existing barriers to perform and practices, probable coping mechanism

FGD was conduct by trained Anthropologist by following a checklist and considering the rule and regulation. FDG was played a triangulation role of information in addition of In-depth Interview. This would help to elicit respondent's perceptions including knowledge and practice and identify their felt-need to overcome existing barriers etc.

**Informal Discussion:**

**Areas to Cover:**
- Getting types of services and perception of the services (animal food)
- Effectiveness of the messages
- Facing difficulties to performed on it
- Identify the felt needs of the services (from whom get the help most and he/she solve)

Informal Discussion was hold with the other programme staffs.

**Data Collection and Analysis Process:** All subjects involved in this research were informed of the study rationale, procedures, potential risks and benefits and their right to withdraw from the study at any time. It was made very clear that participation was fully charitable and that subjects had the right to decline to answer questions if they wish. All participants were optimistic to ask questions at any time during the research (See Annex A for informed consent form filled by respondent).

Quantitative data was coding, cleaning, analysis using SPSS 17.0 version and thematic analysis plan (Table 4) were used for qualitative data analysis by expert anthropologist. A written consent was taken from each of the respondents informing them regarding the privacy of their answer. No external ethical review committee was consulted.

| Theme Community assessment | Practices on food consumption and preparationKnowledge on food and dietHousehold practices for health and hygiene |
|----------------------------|-------------------------------------------------------------------------------------------------|
| **Sub-theme A** Perceived need | Food preparation processBalanced dietUses of water |
| **Sub-theme B** Available services | Hygiene practicesNutritious foodSanitation |
| **Sub-theme C** Available food and nutrition services in locality | Age specific food consumptionUsefulness of balanced/nutritious foodHealth |
| **Sub-theme D** Requirement | Barriers to consume food in different stagesAge specific food consumptionHygiene |
| **Sub-theme E** Self capabilitySources of (knowledge) Limitation | |

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**Table 3:** Qualitative sampling procedure

| Name of items        | Intervention areas (n=8 uz)                                                                 | Control areas (n=4 uz)                      |
|----------------------|------------------------------------------------------------------------------------------|-------------------------------------------|
| In-depth interview   | With 4 SSs, 16 PKs, 24 mothers                                                          | With 12 SSs, 12 mothers                   |
| Focus group discussion | With 4 SSs, 2 PKs group where each group contain 6-8 persons.                            | With 2 SSs                                 |
| Informal Discussion  | With 4 other program staffs                                                             | With 2 other program staffs               |
Results

Socio Demographic Profile of the Respondents

The population distribution by age groups was similar irrespective of the intervention and control areas (Table 5). Among the entire household the female members were about 52%. It was found that 40% had primary education (I-V), about 35% had secondary and higher level while 25% of the population had no schooling.

It is noted that children below 7 years were excluded from the analysis for school education. The respondents were largely Muslim (93.5%). Almost all the mothers (N=100%) were involved with the household chores in addition with other income generating activities (IGA). Among the household members some were engaged with farming (28.8%), business (19.6%), service (15.6%), and other IGAs (36%) like daily wage laborer, begging, retired, tuitions, student, etc (Table 5).

From the qualitative part, we found that mothers’ average age was 26 years, while fathers’ average age was 34. Average age of PKs, SSS and other programme staffs were 29, 39, 30 years respectively. Among the respondents, educational status of the mothers was mostly primary level passed. Fathers were mostly at secondary level, where some mothers and fathers were found to be illiterate. Among the programme staffs most of the PKs were HSC (grade XII) passed where some were SSC (grade X) and the other staffs were graduate. Among the respondents majority were Muslim.

Table 5: Socio-demographic profile of HHs by study areas (%)

| Study variables         | Study areas          | Intervention (%) N=4129 | Control (%) N =2078 | All (%) -N =6207 |
|-------------------------|----------------------|-------------------------|---------------------|------------------|
| Age in years            |                      |                         |                     |                  |
| < 2                     | 19.9                 | 19.9                    | 19.9                |
| 2 - <5                  | 4.2                  | 3.9                     | 4.1                 |
| 5 - 9                   | 10.9                 | 10.9                    | 10.9                |
| 10 - 19                 | 11.6                 | 11.7                    | 11.6                |
| 20 – 45                 | 41.1                 | 42.8                    | 41.8                |
| 46 and above            | 12.1                 | 10.7                    | 11.7                |
| Sex                     |                      |                         |                     |                  |
| Male                    | 48.2                 | 48.7                    | 48.3                |
| Female                  | 51.8                 | 51.3                    | 51.7                |
| Have school education   |                      |                         |                     |                  |
| No schooling            | 24.3                 | 27.5                    | 25.3                |
| Primary (I-V)           | 40.6                 | 38.6                    | 40.0                |
| Secondary and above     | 35.1                 | 33.9                    | 34.7                |
| Religion                |                      |                         |                     |                  |
| Muslim                  | 93.3                 | 94.5                    | 93.5                |
| Non-Muslim              | 7.0                  | 5.5                     | 6.5                 |
| Occupation              |                      |                         |                     |                  |
| Farming                 | 29.8                 | 27.8                    | 28.8                |
| Business                | 19.5                 | 19.6                    | 19.6                |
| Services                | 13.7                 | 17.4                    | 15.6                |
| Others                  | 37.0                 | 35.2                    | 36.1                |
| HH monthly income (Tk.) |                      |                         |                     |                  |
| ≤5000                   | 16.9                 | 16.2                    | 16.6                |
| 5001-10000              | 50.2                 | 54.4                    | 51.6                |
| 10001-20000             | 26.3                 | 21.4                    | 24.7                |
| 30001-50000             | 6.6                  | 8.0                     | 7.1                 |
In the case of age-specific food, majority of the mothers in the intervention areas were enabled to mention about the quantity of food, because they knew from the A&T programme and got a measuring bowl to feed their babies appropriately, but in control areas the mothers and even the health workers couldn’t mention it properly. The reasons for providing complementary feeding (CF) were mainly for cognitive development and get proper nutrition by the intervention areas and reduce stunting by the control areas. For CF they mainly preferred rice, vegetables, egg and fish. Shadowing in Dinajpur found that the mothers did not have any preferred food for their children at first initiation of complementary feeding stage.

Mother’s Knowledge and Perception on Providing Food from Animal Sources

Among the respondents vast majority (90.4%) had awareness and knowledge on animal foods as rich sources of protein (Table 6). Rests of them were found to be aware with lack of confidence, means they knew the fact but had some confusion. Mostly they preferred fish (28.3%) then eggs (24%) in all areas. The preferences for meat were 20%, milk 18% and liver 9%. Negligible differences were observed in perception of mothers between intervention and control areas. The reason for choosing such animal sources was mainly for maintaining good health of the children (Table 6), which was 62.25% in intervention and 57.3% in control areas. Some of the mothers (25.3%) emphasized those animal foods to build good physical and mental health of their children. Little number of the respondents (N=12.9%) agreed for animal sources to protect the children from diseases. Only 0.6% of the mothers felt the necessity of foods from animal sources to meet nutrients need and cognitive development. In the case of frequency of having those animal sources for the children, most of the mothers responded for average 3 times per week (6.74%) and rest mentioned for average 3 times for per day (2.84%).

From the qualitative part, it was found that majority of the mothers, except from Barguna, mentioned that the starting time for giving animal foods to children was after 6 months of age, whereas mothers from control areas stated that it was 10 months. According to PKs and Ss importance of animal food was well known to almost all. They emphasized on its importance on child health by intake nutrient specially protein, which helped to increasing immunity and decreasing anemia and keeping them well. The rest of the participants mentioned the matter to some extent.

| Table 6: Status of mother’s knowledge status on animal food (%) |
|---------------------------------------------------------------|
| **Programme areas**                                         |
|                                                            |
| **Intervention (%)** | **Control (%)** | **All (%)** |
|                   | 95.4           | 80.4        | 90.4        |
| Yes                | 0.45           | 0.9         | 0.6         |
| No                 | 4.35           | 18.3        | 9.0         |
| **Preference type of Animal sources**                       |
| Fish              | 28.35          | 28.2        | 28.3        |
| Eggs              | 24.45          | 23.4        | 24.1        |
| Milk              | 17.85          | 19.2        | 18.3        |
| Meat              | 20.85          | 18.9        | 20.2        |
| Liver             | 9.45           | 8.1         | 9.1         |
| **Reasons for choose that type of food**                    |
| To build good physical and mental health                    | 27.0          | 21.9        | 25.3        |
| To protect from Diseases                                   | 13.5          | 11.7        | 12.9        |
| For maintaining good health                                | 62.25         | 57.3        | 60.6        |
| To meet the nutritional need                                | 0.75          | 0.33        | 0.6         |
| Cognitive development                                      | 0.6           | 0.3         | 0.6         |
| **Frequency of animal food average 3 times**               |
| Average per day for 3 times                                 | 4.22          | 8.7         | 2.84        |
| Average per week for 3 times                               | 10.14         | 20.07       | 6.74        |
| N                 | 800           | 400         | 1200        |
The situation in control areas was worst for getting food from animal sources. The most common barriers to intake animal food were lack of finance and education, myths, religious beliefs, and lack of motivation and knowledge. So need to provide more manpower and creating opportunity to build a comprehensive IYCF practices.

While asked for the sources of the information PKs and Ss mentioned about the training, refresher meeting, book, media, own experience, and so on, but vast majority of the mothers from Sylhet mentioned PKs name. Whereas very few mothers from other areas told that PKs and TV/radio were the sources of their knowledge on feed from animal sources. Mostly we found that mothers were influenced by their mother-in-laws and other family members of the household although they come to knew the mater from the A&T staffs but could not apply that knowledge for their ancestors. So, they avoided mentioning any of the sources of knowledge they acquired.

From the qualitative part, we came to know some barriers from mothers and also from the programme staff. An upazila manager form Barguna mentioned about some barriers from his experience (see in the box).

**Case from Dinajpur**

In Dinajpur intervention area, from shadowing with mother we found that the she did not know the effect of shop food. She and her family members preferred biscuit, lichi jam (artificial litchi candy), cerelacs, chocolate, noodles, etc. to feed their babies. Mothers took rice with pulses to feed the baby in the morning, and for the whole day she tried to feed that rice for 3/4 times, which the child refused again and again. During shadowing the PK and SS came to the mother and showed what and how to feed their babies. They also advised on feeding from animal sources and not to feed from shop. During interview we found that she actually did not knew the matter.

Information on animal food intake at the HH level is presented in Table 7 to have an idea of its consumption status. It was found that 31% of the total HHs consumed fish frequently, it was better in intervention areas (34%) compared to that in control areas (29%). The other animal food sources were egg (25%), milk and milk products (18%), meat (17%), etc. Rest of the respondents seldom consumed food from animal sources. Overall, the consumption status of the intervention areas was much better than those of control.

Table 8 shows that all the respondents in intervention areas provided foods from animal sources to their children whether small or large in quantity mostly were from their own sources (92%), but others had collected from other sources (8%). Most mothers from the control areas fed their children food from animal sources (91%); mostly got it from their own pet sources (77%). The rest of the respondents did not provide any animal food to their children.

Among different age group of children, the mean per capita daily intakes of energy and other nutrients were higher in intervention areas compared to those in control areas in relation to the recommended dietary allowances (RDA) (Table-9). Average energy intake was estimated to be higher among all the age groups in the intervention areas. Mean calcium intake was highest (254mg) among children aged 12-23 months in intervention areas and it was 207mg in the same age group of controls. Gap between calcium intake and RDA was increased as the age group of the children decreased. In control areas iron intake was 2mg among the lowest age group (6–8 months) children compared to that in any other age groups irrespective of areas, but all the age groups’ iron consumption was inadequate in relation to the RDA. Protein intake was high in intervention areas among the children, like 18mg in the age group 12-23 months, which also higher than the RDA, about 13mg among 9-11 months, and about 8mg among 6-8 months. The situation of control areas was similar to the intervention areas.

Figure 1 indicates that protein intake was lower than the recommendation (9.1%) in both intervention (7.9%) and control (5.7%) areas among children aged 6-8 months. As the children became older, protein consumption was increased compared to the recommendation (11%) except the age group of 9-11 months in control areas (9.7%) but it was increased in the intervention areas (12.9%). But protein consumption in intervention areas was better among age groups compared to control areas. Again among the age group of 12-23 months protein intake were increased control (14.33%) and intervention areas (18.22%) areas then the recommendation (13%).

Figure 2 shows that at different HH income level, food consumption from animal sources for the under-two children varied. Consumption of animal food was 17% whose monthly income was...
Table 9: Children's mean per capita daily intake of energy and other nutrients by age groups

|                      | RDA* | 6 - 8 months (Mean) | 9 - 11 months (Mean) | RDA* | 12 - 23 months (Mean) |
|----------------------|------|----------------------|-----------------------|------|-----------------------|
|                      | (<1 years) | Intervention (n=156) | Control (n=76) | Intervention (n=204) | Control (n=71) | Intervention (n=440) | Control (n=253) |
| Amount of food (g)   | -    | 151.0                | 137.93                | 220.78 | 196.93                | -    | 314.23                | 266.43                |
| Energy (Cal.)        | 820  | 310.0                | 258.59                | 490.75 | 406.35                | 1360  | 663.32                | 547.61                |
| CHO (g)              | -    | 42.4                 | 39.55                 | 65.27  | 59.54                 | -    | 98.12                 | 82.49                 |
| Protein (g)          | 14   | 7.91                 | 5.72                  | 12.91  | 9.74                  | 16   | 18.22                 | 14.33                 |
| Fat (gm)             | -    | 11.38                | 8.31                  | 17.47  | 13.72                 | -    | 20.40                 | 15.34                 |
| Vitamin A (µg)       | 300  | 317.32               | 186.36                | 498.46 | 311.69                | 250  | 596.23                | 425.99                |
| Vitamin B1 (mg)      | 0.3  | 0.18                 | 0.12                  | 0.29   | 0.17                  | 0.5  | 0.39                  | 0.35                  |
| Vitamin B2 (mg)      | 0.5  | 0.19                 | 0.18                  | 0.34   | 0.22                  | 0.8  | 0.42                  | 0.35                  |
| Vitamin C (mg)       | 20   | 13.71                | 8.11                  | 24.11  | 19.27                 | 20   | 35.01                 | 32.52                 |
| Iron (mg)            | 5    | 3.27                 | 1.96                  | 6.11   | 3.97                  | 10   | 7.33                  | 6.34                  |
| Calcium (mg)         | 500  | 126.17               | 96.16                 | 200.51 | 146.46                | 600  | 253.92                | 207.38                |

*WHO (1974). Handbook on human nutritional requirement.  *HKI & WFP (1988). Tables of nutrient composition.

Figure 1: Protein intake in the study areas according to recommendation. Protein intake is lower in the intervention group compared to the control group. However, the recommendation for protein intake is met in both groups. Figure 2: Consumption from animal sources considering different HH income level. Figure 3: Consumption from animal and non animal sources by educational level.
This categorization was done following WHO guideline (2009), which was found appropriate to counsel for appropriate IYCF practices. Dietary diversity score was averaged from three days' recall of food intake by the children. Table 10 shows that most of the children, irrespective of intervention and control areas, had cereals. Dietary diversification was found to be improved as age of the children increased. Varieties of food consumption might not improve nutrient adequacies until ensured the required quantity. It was found that very few children (average 0.3) were fed only rice among all age groups. In intervention areas among the 6-8 months age group children, mostly consumed from 5 food groups (28.8%) and all food groups (28.8%) but in control areas this age group children consumed from all food groups (28.9%) per day. In those cases, it was found that those age groups children consumed mostly cereals with pulse and vegetables; pulse, vegetables and fish/egg; suji with egg and milk; etc in both interventional and control areas. Among the 9-11 and 12-23 months age group children in intervention areas who regularly consumed food from all groups were 35% and 48% respectively, where in control areas that was 41% and 49% respectively. 12-23 months age group children, were taken food from all groups were 49%.

Table 11 shows, the intake of cereals (100%) and vegetables (92%) were two most common food items taken by children. Children from intervention areas consumed fish (84%) compared to that in the control areas (76%). Intake of beef (18%), all types of liver (30%), milk (56%) was pretty higher in control areas. On the other hand, consumption of chicken (25%), mutton (2%) and egg (73%) were much higher in intervention areas. Consumption of sweet and milk products was almost same in both areas. The table 12 shows the children of all age groups were mostly fed cereals based food like suji, rice, ruti, bread, etc. and vegetables, milk and milk products, sweets, molasses, legumes, oil and fat. Fish was mostly included after the 9 months of age. Some fruits were added for the age group 12-23 months. Among all the age groups, the rest of the food was introduced but in very low quantity. It was apparent that dietary diversification was there but might not be at satisfactory level due to less prioritizing of food from animal sources, which they were counseled according to the A&T programme guideline.

Table 10: Providing of diversified food for the children by age group (%)

| Food groups                  | 6-8 month |         | 9-11 month |         | 12-23 month |         |
|------------------------------|-----------|---------|------------|---------|-------------|---------|
|                              | Intervention | Control | Intervention | Control | Intervention | Control |
| Only cereals                 | 0         | 2.6     | 1.0        | 0       | 0           | 0.4     |
| Cereals plus any 1 group     | 1.9       | 5.3     | 0.5        | 0       | 0.2         | 0.8     |
| Cereals plus any 2 groups    | 5.1       | 13.2    | 1.5        | 1.4     | 0.5         | 1.2     |
| Cereals plus any 3 groups    | 12.2      | 13.2    | 8.3        | 4.2     | 4.5         | 6.3     |
| Cereals plus any 4 groups    | 28.8      | 23.7    | 23.5       | 16.9    | 16.4        | 15.8    |
| Cereals plus any 5 groups    | 23.1      | 13.2    | 30.4       | 36.6    | 30.7        | 26.1    |
| Cereals plus all groups      | 28.8      | 28.9    | 34.8       | 40.8    | 47.7        | 49.4    |
| Total (N=1200)               | (n=156)   | (n=76)  | (n=204)    | (n=71)  | (n=440)     | (n=253) |

Table 11: Percentage and frequency of different food items intake by children (three days' average study areas average)

| Sources of food            | Intervention | Control | All |
|----------------------------|--------------|---------|-----|
|                            | Children (%) | Meals (Nos.) | Children (%) | Meals (Nos.) | Children (%) | Meals (Nos.) |
| Cereals                    | 100          | 2.50     | 100 | 2.35 | 100 | 2.45 |
| Vegetables (leafy & non-leafy, fiber) | 92.61 | 1.38 | 90.59 | 1.40 | 91.94 | 1.39 |
| Fruits                     | 75.79        | 1.04     | 74.55 | 1.05 | 75.38 | 1.04 |
| Fish                       | 84.20        | 1.16     | 75.57 | 1.02 | 81.32 | 1.12 |
| Cow’s meat                 | 14.65        | 0.66     | 18.07 | 0.59 | 15.79 | 0.63 |
| Chicken meat               | 24.71        | 0.62     | 20.87 | 0.54 | 23.43 | 0.60 |
| Goat’s meat                | 2.29         | 0.48     | 0.76   | 0.66 | 1.78 | 0.50 |
| Liver (all types)          | 25.35        | 0.52     | 30.28 | 0.47 | 26.99 | 0.50 |
| Egg                        | 73.38        | 0.74     | 59.03 | 0.66 | 68.59 | 0.71 |
| Milk                       | 49.29        | 1.20     | 56.23 | 1.28 | 51.61 | 1.23 |
| Sweet & milk product       | 21.02        | 0.96     | 22.14 | 0.97 | 21.39 | 0.96 |
| Molasses                   | 27.52        | 1.06     | 41.48 | 1.19 | 32.17 | 1.12 |
| Legumes                    | 71.97        | 1.01     | 67.94 | 0.97 | 70.63 | 1.00 |
| Fats & oils                | 96.31        | 2.16     | 93.13 | 1.92 | 95.24 | 2.08 |
Through shadowing a mother in Sylhet control area, we found that she preferred to give breast milk to her child at the age of 10 months than providing complementary food. During whole day observation, we found that she fed mostly *semai* (vermicelli with milk) and breast milk while the child cried. And for once (at 11 a.m.) she tried for hotchpotch (made by rice, pulse, vegetables) to the child.

Table 12: No. of meals/day (Averaged from last 3 days) of different food groups by children of different age groups

| Name of sources             | 6-8 month (mean) | 9-11 month (mean) | 12-23 month (mean) |
|-----------------------------|------------------|-------------------|-------------------|
|                             | Intervention     | Control           | Intervention      | Control           | Intervention      | Control           |
|                             | (n=153)          | (n=71)            | (n=199)           | (n=71)            | (n=433)           | (n=251)           |
| Cereals                     | 2.04             | 1.81              | 2.50              | 2.27              | 2.66              | 2.52              |
| Vegetables (leafy & non-leafy, fiber) | 1.36             | 1.00              | 1.39              | 1.29              | 1.39              | 1.52              |
| Fruits                      | 0.89             | 0.89              | 0.99              | 0.96              | 1.10              | 1.12              |
| Fish                        | 0.98             | 0.78              | 1.16              | 1.04              | 1.21              | 1.06              |
| Cow's meat                  | 0.75             | 0.46              | 0.64              | 0.43              | 0.66              | 0.62              |
| Chicken meat                | 0.56             | 0.77              | 0.57              | 0.51              | 0.64              | 0.54              |
| Goat's meat                 | 0.33             | 0.00              | 0.33              | 0.00              | 0.51              | 0.66              |
| Liver (all type)            | 0.54             | 0.44              | 0.57              | 0.55              | 0.48              | 0.45              |
| Egg                         | 0.65             | 0.64              | 0.77              | 0.63              | 0.75              | 0.68              |
| Milk                        | 1.15             | 1.34              | 1.16              | 1.37              | 1.23              | 1.24              |
| Sweet & milk product        | 1.11             | 1.12              | 0.98              | 0.95              | 0.91              | 0.95              |
| Molasses                    | 1.44             | 1.45              | 1.03              | 1.21              | 0.97              | 1.10              |
| Legumes                     | 1.04             | 0.94              | 1.05              | 0.96±             | 0.98              | 0.98              |
| Fats & oils                 | 1.80             | 1.44              | 2.17              | 1.81              | 2.26              | 2.05              |

Discussion

Animal foods are the main sources of quality protein required to make its provision in complementary diet for the child. From the present study we found among the respondents, the main animal food sources for the child were meat/liver, fish and egg. The ratio of these to meet protein requirement was 17%, although protein's bioavailability from animal-based food is higher. But the contributions of other sources like fish, meat/liver, and egg were 5%, 6% and 4% respectively. The children consumed 14% protein from animal sources was seemed to be lower in the age group 6-8 months compared to other age groups. It is reflected in the individual nutrient intakes.

Food intakes in the intervention areas were better compared to the control areas, but the gap was narrow. Food items like rice, vegetable, eggs provided to the children were from own sources and domestic products. Others items like meat, fish, milk, edible oil, pulse, etc. procured from local market might compromise quantity. Therefore, dietary diversity could meet nutrient requirements, but due to limitations in quantity might hinder nutrient availability.

Inadequate amount of food consumption as sources of macro-nutrients (carbohydrate, protein, fat) reflected similar deficiencies [14]. By the Food Consumption Score (FCS), according to the frequency of consumption of eight food groups, we calculated a weighted score that consumed by the children for three consecutive days. It was found that food such as cereals, vegetables, and pulses only provided more energy to the children aged below 8 months, though pulses are considered as good source of plant protein complementary to that of cereal. Protein-rich foods such as milk, meat, eggs, and fish, which also contain micro-nutrients (calcium, iron, zinc, etc.), are given the highest value category [15,16,17]. In general, the reasons behind the contributing factors for low consumption of animal food were lack of purchasing power, price hike of the food, lack of knowledge, barriers from family like local myths and sometimes for some ritual.

The barriers differed by regions. In Dinajpur, people had money but they were less interested to provide food to the children from...
animal sources. In Chittagong, the elderly members of the family preferred traditional IYCF practices, and also fathers were less likely to involve with income generating activities. The similar beliefs were found in Sylhet. On the other hand, in Sylhet due to more migrants, especially in UK, people faced high price of commodity in local market. The poor people failed to buy beyond their limitation. Both intervention and control groups faced the problem of health service providers, especially POs supervising the PKs and SSs. The religious barriers restricted in allowing male POs to counsel the family.

In control areas, consumption of milk and milk products - primarily cereal-based foods cooked with milk like vermicelli, suji, etc. - were higher compared to other food groups. They mostly preferred shop foods like cerelec (formula baby food), which were readily available and easy to prepare. In some places in intervention areas, mothers were yet to be aware about the importance of animal foods and disadvantages of processed foods. In addition, motivational activities need to be strengthened in favor of providing animal foods as complementary to the children instead of shop/processed foods that might cause of appetite loss or sickness.

**Conclusion**

To meet protein for infant need to more awareness and ensure practice for food from animal sources, need to encourage for animal and plant protein. This conclusion for infant can be applied for anywhere. But need to ensure all level of support from government and NGO as well media to increase knowledge and ensure practices.

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