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Identified Factors Behind Low Consumption of Animal Foods among the Children of 6 - 23 Months Old in Alive and Thrive Intervention Areas in Bangladesh

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Abstract

Background: In Bangladesh, more than two-thirds of total food consumption is rice as main staple, especially for the poor, in addition to some vegetables, pulses and small quantities of fish, meat, egg, etc. if and when available. The similar dietary pattern and practices were found for under two years old children in the intervention areas of Alive and Thrive (A & T) project where consumption of animal foods by children was minimal even after being counseled on its rightly mentioned. Premising the facts, BRAC Research and Evaluation Division (RED) intended to investigate the factors that might have led to the consumption of least amount of protein from animal foods by the children in the A & T intervention areas. Objective: To investigate the dietary intake pattern of the children aged 6 - 23 months from beneficiary households and identify the factors that might have led to the lower intake of animal diets by those of the children. Methods: Mixed methods were applied to gather necessary information for the study. Quantitative tools were used to collect information on socioeconomic profile of the beneficiary households, feeding practice or dietary intake pattern of the children whereas qualitative tools were used to recognize the opportunities and barriers of the beneficiaries for feeding lower amount of animal foods to their children. Twelve *upazilas* were selected purposively from 4 districts (four geological corners of Bangladesh): Barguna, Sylhet, Chittagong and Dinajpur districts (3 from each). One control and two intervention *upazilas* were selected from each of the districts. The intervention areas were selected where A & T supported health programmes and other BRAC health programmes were operating. The control areas were selected where other BRAC health programmes were operating except A & T pro-

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gramme. The *Pusti Kormi* (PK), *Shasthya Shebika* (SS) and mothers/caregivers enrolled in the A & T intervention areas were selected for interview, in addition to those who had involvement in services from the supervisory level. Results: Quantitative findings of the study revealed that food intake from animal sources in intervention areas was 7 - 12 g at the age 1 year and 18 g at 2 years where the recommended dietary average (RDA) was 14 g for less than one year and 16 g for less than 2 years. These were also lower in comparison to those counter parts of control areas. The qualitative findings indicated that the major factors hindered in feeding foods from animal sources were lack of knowledge, lack of awareness on protein deficiency, obstacles from the senior members of the family, myth like fish intake create worm, taboos, etc. Other barriers were found from the quantitative findings, like financial crisis (intervention area 80%; control area 78%), unavailability of the food products in local market (intervention area 5%; control area 3%), etc. Conclusion: Food consumption from animal sources might be increased among the under two years old children by reinforcing efforts in awareness development process addressing those of the challenges that might create demand for appropriate IYCF services at the household level.

Keywords

IYCF, Food Consumption, Animal Sources, Barriers, Factors, Bangladesh

Subject Areas: Anthropology, Biodiversity, Epidemiology, Food Science & Technology, Global Health, Health Policy, Nursing, Nutrition, Pediatrics, Public Health

1. Introduction

The diet of most of the population in Bangladesh is mainly the cereals-based staples. About two-thirds of the total food consumption is rice along with vegetables, pulses and small amount of fish, if available [1]. The similar dietary pattern was found in the Alive and Thrive (A & T) intervention areas where mothers were counseled on mentioned properly as a component of Infant and Young Child Feeding (IYCF). It was observed that most of the mothers/caregivers provided less diversified diet to their children even after being counseled by health volunteers. The internal monitoring team of A & T programme of BRAC observed that the average consumption of foods particularly from animal sources was very low in the intervention areas. Animal foods are the major source of quality protein and essential micronutrients, namely, iron, zinc, etc. Fish, especially is one of the important animal food sources that supplies protein and micronutrients with high bioavailability [2] [3]. Children may become stunted if they do not receive adequate quantities of quality complementary foods after 6 months of age. It was estimated that around 6% of under five years old children's death can be prevented by ensuring optimal complementary feeding [4]. BRAC health care volunteers under Alive and Thrive program deliver messages and counsel the enrolled mothers to include food from animal sources along with vegetables fruits and other food groups in the daily menu of their children's diet. Despite rigorous messaging on the importance of diversified consumption for the children in A & T intervention areas, low consumption of animal foods by them emphasizes the importance of exploring the facts behind it. There might be gaps in terms of knowledge, perception and practice of the mothers or the volunteers who had been delivering services in the intervention areas, or might be the other way around, for instance, the financial insufficiency of the households to buy animal foods, etc. BRAC-RED intended to identify the gaps that might hinder the animal food consumption of the children in different areas of A & T, even after having intensive IYCF counseling.

2. Objective

This study aims to investigate into the dietary intake pattern of the children and identify the factors contributing to low consumption of animal foods by children aged 6 - 23 months in A & T intervention areas.

2.1. Specific Objectives

1) To determine the dietary intake pattern of the children aged 6 - 23 months through 24-hour dietary recall

and three days dietary diversity information;

2) To identify the specific barriers prohibit the mothers to provide animal foods in the complementary food to their children;

3) To explore the knowledge and perception of the mothers/caregivers regarding the importance of providing animal foods in the complementary diet.

2.2. Methods

2.2.1. Study Design

Both quantitative and qualitative methods were employed to collect data.

2.2.2. Study Population

At the delivery level, SSs (*Shyastha Sebikas*) and PKs (*Pushti Kormis*) were selected as the respondents, who basically work as frontline health care providers to deliver the IYCF services under the A & T programme. In addition, *upazila* managers (UM), branch managers (BM), and programme organizers (PO) were also interviewed to know their views. At the recipient level, mothers or caregivers and fathers of the children were selected as the respondents.

2.3. Eligibility

Inclusion criteria:

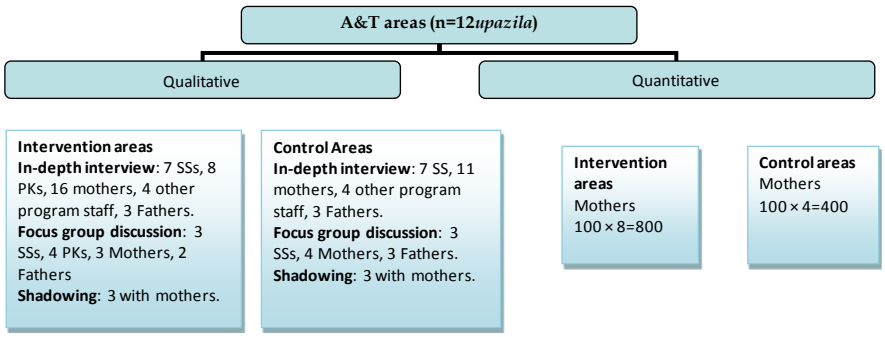
- Mothers having children aged 6 - 23 months;
- SSs/PKs/other programme staff of BRAC working in the selected areas.

Exclusion criteria:

- Those who were visibly ill and/or uncomfortable to participate in the study;
- Mothers having no children aged 6 - 23 months.

2.4. Study Site and Sample

Twelve *upazilas* (Sub districts) from four districts (Dinajpur, Sylhet, Chittagong and Barguna) were selected using purposive sampling method from four different geographical locations. The intervention areas were selected where A & T supported health programmes as well as others BRAC health programmes were operating. The control areas were selected where other BRAC health programmes were operating except A & T programme. Study populations were selected randomly in such a way so that each district contains one control and two intervention *upazilas*.



2.5. Sample Size Selection Procedure

The following formula was applied for sample size estimation.

$$n = Z^2 pq / d^2$$
$$= (1.96)^2 (0.5)(0.5) / (0.05)^2$$
$$= 384.16 = 384 \text{ or approximately } 400,$$

where

n = required sample size;

Z = confidence limit set at 1.96 which corresponds to 95%;

p = the estimated prevalence of relation between the maternal socioeconomic status and the outcome of the newborn;

q = 1 − p = 1 − 0.5 = 0.5;

d = degree of accuracy desired, usually set at 5% (0.05).

Multistage procedure for sample size selection was applied and the approximate sample made double to avoid precession error. So, the total sample would be 800 (400 × 2) for the eight intervention areas and half of it *i.e.*, 400 from four areas were selected as control.

Simple random sampling was followed for entire stages to select mothers/caregivers, like

Selected *upazilas* → SSs → Mothers

Selected 12 *upazilas* → 10 SSs (each *upazila*) → 10 Mothers (each SS)

2.6. Tools of the Study

A pre-tested structured questionnaire was used to collect information on dietary intake, performance of SSs/PKs on complementary feeding, counseling, etc. Semi-structured questionnaires were used to conduct in-depth interview, shadowing, and focus group discussions (FGD) in exploring the knowledge and perceptions of the mothers and SSs. Thematic plan was used for qualitative data analysis by expert anthropologist.

In-depth interviews covered the following topics:

- Socioeconomic status of the key informants;
- Service delivery by SSs and PKs in their catchment HHs (other sources of information);
- 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.

The following themes were selected for conducting FGDs:

- Socioeconomic status of the respondents;
- Influencing factors of animal food consumption;
- Existing barriers to perform and practice, probable coping mechanism.

Shadowing with mothers covered the following topics:

- Practices of mothers on providing food to children from animal sources;
- By a daylong observation barriers from the family members tried to identified;
- Mothers knowledge, perception and practices.

2.7. Data Collection

Twenty-five enumerators were recruited to collect quantitative information. They were provided intensive training for 5 days to collect data of 24-hour dietary recall, 3-day dietary diversity, and other relevant information. Amount of household food consumption was measured by a set of standard measuring cups and spoon which were provided to the enumerators. Each enumerator collected data from four households every day. On the other hand, eight anthropologists were recruited to collect the qualitative data and conduct in-depth interviews, FGDs, and shadowing.

2.8. Data Analysis

The qualitative analysis was performed as per the thematic analysis plan. Quantitative data analysis was done using SPSS version 17. Household 24 hour dietary recall method was used to obtain the amount of food consumed by children, based on the dishes and ingredients. The ingredients were collected by details on the family or local amount, which were then converted into grams for convenience in determining the nutrient, especially the protein consumption. The household member responsible for preparing food and feeding children was interviewed to obtain information on food consumption over the past 24 hours. Besides, a 3-day recall method was followed to know the status of dietary diversity of the under-two children.

2.9. Ethical Issues

The respondents were informed and taken their consent prior to conduct the interviews and it was told that their

names and other personal information was never be linked. And they had the freedom for disagree, stop, withdrawl the interview. Adequate care was also taken for maintaining confidentiality. All identifying information would be tailored in case studies cited in reports and only summatived data was circulated during focus groups discussion. All data were stored on password protected computer of the researcher. Only the primary investigators had access to this information. To guarantee ambiguity of the participants, codes was used to identify participants and groups in all stages of this research. Also a consent (either oral or written) from the participoent will be ensured to get the information from them. Ethical clearance for this study was approved from both the research and evaluation division (RED) and health, nutrition and population programme (HNPP) of BRAC. The areas and population of the study were BRAC HNPP areas where intervention provided under Alive and Thrive (A & T) project. So by the demand of the programme to find out the barriers for appropriate infant feeding practices and cause of lower consumption of food from animal sources, the study was aimed to be conducted. For that necessary ethical clearance were taken from the HNPP programme and A & T project as well from the RED also to conduct the study.

3. Results

3.1. Socioeconomic Profile of the Respondents

A total number of 1200 households were included in the study of which 800 were from intervention and the rest 400 from control areas. The results show that numbers of household members in all areas were 6207, of them 4129 were from intervention areas and 2078 were from control areas. Among them, 42% comprise the reproductive age group (20 - 45 years). The population distribution by age groups was almost similar irrespective of the intervention and control areas (see **Table 1**).

Table 1. Distribution of households by socioeconomic characteristics.

Study variables	Study areas		
	Intervention % (N = 800)	Control % (N = 400)	All % (N = 1200)
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
Total	**4129**	**2078**	**6207**
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
Total	**2943**	**1464**	**4407**
Religion			
Muslim	93.3	94.5	93.5
Non-Muslim	7.0	5.5	6.5
Total	800	**400**	**1200**
Occupation			
Farming	9.8	5.8	8.5
Business	9.1	9.2	9.1
Services	3.7	7.4	4.9
House wife	37.0	35.1	36.4
Others	40.3	42.5	41.1
Total	**3028**	**1506**	**4534**
HH monthly income (Tk.)			
≤5000	16.9	16.2	16.6
5001 - 10,000	50.2	54.4	51.6
10,001 - 20,000	26.3	21.4	24.7
20,001+	6.6	8.0	7.1

It was found that 40% of the sampled population had primary education (I-V), about 35% secondary and higher level and the rest 25% had no schooling. Children below 7 years were excluded from the analysis for school education. The respondents were largely Muslim (95%). Mostly the mothers were involved with the household chores rather than involving with any income generating activities (IGA) (put percentage here). Among the members of the selected HH were engaged in farming (about 9%), business (9%), service (5%), and other IGAs (41%) like daily wage laborer, begging, retired, tuitions, student, etc and the rest were housewives (36%). Nearly half of the household members were involved with any IGA and about 52% had monthly income within the range of Tk. 5001 - 10,000 (see **Table 1**).

3.2. Complementary Feeding Practice of the Children by the Mothers/Caregivers

Most of the mothers in intervention (93%) and control (90%) areas opined that the starting age of complementary feeding is after 6 months that is appropriate according to the WHO guidelines and recommendation (See **Table 2**). The rest 8% from both areas mentioned that the age of starting complementary feeding is before 6 months. Twenty four percent of the mothers both in intervention and control areas preferred cereals-based food

Table 2. Distribution of households by mothers' knowledge and practice with regards to complementary feeding (%).

	Programme areas		
	Intervention (%)	**Control (%)**	**All (%)**
Complimentary food start			
Before 6 month	7.12	9.75	8
After 6 month	92.88	90.25	92
Preference type of food for complimentary feeding			
Cereals (rice/bread/suji)	23.85	24.00	23.9
Fish	15.45	14.4	15.1
Eggs	14.4	13.8	14.2
Meat/liver	8.55	6.9	8.0
Milk and milk product	8.7	10.8	9.4
Vegetables	21.75	21.3	21.6
Fruits	7.65	7.2	7.5
Others	0.3	0.3	0.3
Reasons for choose that type of food			
Breast milk not sufficient	83.55	87.6	84.9
For maintaining good health	2.7	2.1	2.5
Cognitive development	0.3	0.3	0.3
To met nutritional need	3.6	2.1	3.1
Make the children familiar with complementary food	1.5	2.1	1.7
Due to some other reasons	9.15	4.2	7.5
Frequency of complimentary feeding			
3 times/day	88.0	78.75	84.92
More than 3 times/day	12.0	21.25	15.08
N	800	400	1200

like suji, rice, bread, etc, as the complementary foods for their children. Around 22% in both areas preferred vegetables followed by fish and egg (15%).

Preference on meat, liver, milk and milk products, fruits, etc., was low in both areas (<10%). Mothers in control areas preferred milk and milk products more (11%) for their children in comparison to 9% of the intervention areas. According to the mothers' opinion reasons to prefer complementary foods were largely due to insufficient breast milk before 6 months of age from both interventions (84%) and control areas (88%). Very few mothers from intervention areas (4%) mentioned about the additional nutrients requirement after 6 months of age. Other reasons were, maintaining good health, cognitive development, making the children familiar with semi solid foods, etc.

3.3. Dietary Intake of the Children

Information on children's food intake was collected from the mothers/caregivers through 24-hour dietary recall method. **Table 3** indicates the average per capita per day food intake. It was found (see **Table 3**) that total average food intake was higher in intervention areas (258 g/capita/day) compared to the counterpart in control areas (230 g/capita/day). Among the foods, cereal consumption was higher about 60 g. Average intake of milk and milk products was 57 g while it was higher (65 g) in the control areas compared to the intervention (52 g).

Intake of food from animal sources was not at satisfactory level in both intervention and control areas. Among the animal foods, it was found that only milk and milk product were consumed highest compared to others such as fish intake was 19 g, meat 5 g, and egg 13 g in intervention areas and fish intake 12 g, meat 5 g and egg 8 g in

Table 3. Average food, energy and protein intake by children of 24-hour dietary recall.

Type of foods	Amount of food intake g/capita/day		
	Intervention (mean) N = 800	Control (mean) N = 400	All (mean) N = 1200
Cereal, rice	**62.0**	**53.48**	**59.17**
Pulses	**6.85**	**4.12**	**5.94**
Total vegetables	**42.61**	**30.90**	**38.70**
Roots and tubers	22.76	16.83	20.77
Leafy vegetables	11.13	7.37	9.89
Non-leafy vegetables	8.72	6.69	8.04
Animal sources	**89.25**	**89.64**	**89.43**
Fish	18.80	12.18	16.58
Meat/Liver	5.16	4.67	4.99
Egg	12.83	7.56	11.06
Milk & milk product	52.46	65.24	56.80
Fruits	28.63	25.88	27.73
Oils/fats	**11.0**	**7.13**	**9.70**
Other*	18.02	18.70	18.23
Total	258.35	229.85	248.66
Total energy (cal/capita/day)	**550.11**	**467.97**	**522.32**
Plant sources	452.65	382.14	428.72
Animal sources	97.46	85.83	93.60
Total Protein (gm/capita/day)	**14.68**	**11.83**	**13.71**
Plant sources	7.45	6.13	6.99
Animal sources	7.23	5.70	6.72

*Others included soft drinks, some shop food, honey, sweet meat, sabu, etc.

control areas. Intake of milk and milk products seemed to be higher, which might be due to inclusion of those foods where more or less milk was used as an ingredient, for example *Payesh* (sweet dish made by rice, sugar and milk), major ingredient was rice but it was recorded in this group.

Children's average energy intakes were 550 and 468 Cal/capita/day in intervention and control areas respectively (see **Table 3**), of which >80% came from the plant sources. The energy came largely from cereals because most of the under-two children were fed *suji* (wheat product) with milk and *khichuri* (rice-pulse—vegetables mix preparation—hotchpotch), and the rest came from egg, milk and milk products, pulses, etc. Among the children protein intake was on average 14 g/capita/day (see **Table 3**). The amount between intervention and control areas was almost same. The child got around half of protein from the animal food sources.

3.4. Mothers' Perception on Importance of Animal Food during Complementary Feeding Period

We also tried to find out mothers' perception on animal food (see **Table 4**). More than two third (67% from intervention areas) of the mothers responded that they felt to provide food to the children from animal sources, but the control areas mother didn't' felt so (0.3%) while they started complementary feeding. Rest of the mothers did not feel like that. The mothers perceived the need to feed animal foods to keep their children well (29%). The other reasons for providing animal foods as mentioned were for proper growth (23% intervention and 21% control areas), to meet nutrient (21%) requirements, for cognitive development (17%), etc.

The findings reveal that the perception of the mothers from control areas was worst. Despite knowing usefulness of the animal foods/protein the mothers also mentioned some impairment of consuming those. About 49% mother in both areas pointed out that the children could not digest animal foods. Some mentioned that children could not chew these foods properly (28%) and they did not like to eat. Some myths were identified that consumption of animal foods might be the cause of stomach problem, worm, etc., and a narrow difference existed between two groups.

3.5. Barriers for Animal Food Consumption

More than one-fourth (27%) respondents told that they faced difficulties to feed their children from animal

Table 4. Distribution of households by mothers' perception on importance of animal food inclusion during complementary feeding (%).

Characteristics	Programme areas		
	Intervention N = 800	Control N = 400	All N = 1200
Perceived in need to feed from animal source			
Yes	66.5	0.3	66.8
No	33.0	0.2	33.2
Perceived usefulness of animal food			
For proper growth	22.95	21.0	22.3
Protect from disease	10.65	7.5	9.6
Keep children well	29.85	27.3	29.0
Cognitive development	18.75	14.7	17.4
To met nutrition need	21.9	20.1	21.3
Others	0.45	0.3	0.4
Perceived impairment of animal food			
Children can't digest	52.2	42.0	48.8
Children can't chew it	27.9	27.9	27.9
Family members forbid	10.5	6.9	9.3
Myths (stomach problem, causes of worm, etc.)	6.9	28.2	14.0

sources (see **Table 5**). Most of them mentioned that the main barrier was financial, 83% from intervention and 78% from control areas. The other contributing factors mentioned by the respondents were lower supply of animal foods in nearby markets 11% in intervention areas and 6% in control areas, scarcity in households (5% in intervention and 3% in control), family members specially in-laws and husbands prohibited the caregivers to feed foods from animal sources (3% intervention areas, 2% control areas), and also sometimes obstacles came from neighbors and relatives.

Mothers tried to overcome those barriers by themselves, like arranging funds from other sources (46%) and rearing cow, poultry, duck, etc. (26% both areas), about 13% mothers solved the financial constraints by discussing with their family members in both areas and some of them (12% average both areas) minimized other expenses to increase expenditures for the children while the rest did not try anything.

3.6. Essence from Qualitative Information

A mother (Dinajpur control area) knew well about complementary feeding, though she started it before 6 months due to insufficient of breast milk. She tried to feed the child different fruits available in HH, egg, fish from own sources and tried to feed responsively. But she tried several times to feed the baby. This made the baby less appetite.

Findings from qualitative information analyses reveal that, in the intervention areas of Chittagong and Dinajpur, several mothers mostly add complementary foods to their children after the age of six months. Some mothers particularly from Sylhet informed that they would also start complementary feeding after ten months. In Sylhet, we found most of the Hindu families delayed to start providing complementary food due to their "*Annoprashon*"* ritual (Annaprashion is a ritual maintains by Hindu religion. Where child at first feed rice and other ingredients, after forming a prayer by their religious person called Brammon. That time a feast also arranged for guest. That time guest also brings some gift for the baby). In control areas may mothers reported of practicing early initiation of complementary feeding. A mother from Dinajpur said,

Table 5. Distribution of household members by perceived barriers of mothers faced to feed animal food (%).

Characteristics	Programme areas		
	Intervention N = 800 (%)	Control N = 400 (%)	All N = 1200 (%)
Is there any difficulties to feed animal food			
Yes, often	23.4	33.9	26.9
Not at all	72.45	61.5	68.8
Sometimes	4.35	4.2	4.3
Type of barriers			
Financial	82.6	78.0	80.3
From family members	2.7	2.1	2.5
From relatives and neighbor	2.0	0	2.0
Low supply in near market	11.4	6.0	9.6
Animal sources not available	5.4	3.3	4.7
Others	1.05	0.6	0.9
Initiative taken to met the barriers			
Started own cattle/goat/hen/duck etc raring	25.8	25.8	25.8
Discuss with family to solve	13.5	13.2	13.4
Lower other expenses to increase expenses for child	10.8	13.8	11.8
Consult with A & T staff/doctor	2.7	0	1.8
Tried for another sources of income	36.9	63.6	45.8
Nothing	1.8	3.6	2.4

"*Before 6 months of age*, *we provided honey and cow's milk*, *if the child was crying*. *She provided her child a biscuit at morning*, *then rice with egg and some banana*, *in noon time rice with vegetables*, *in the afternoon serelac* (*infant formula*), *and breast milk only at night*."

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.

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, mothers and even health workers couldn't mention it properly. The reasons of providing complementary food (CF) were mainly for cognitive development and get proper nutrition of the children of the considered age group in the intervention areas and reducing stunting in the control areas. For CF they mainly preferred rice, vegetables, egg and fish.

Shadowing in Dinajpur found that the mothers did not have any junk food for their children.

3.7. Barriers Reported by the Respondents during Feeding

An *upazila* manager form Barguna mentioned that the most common barriers to intake animal food were lack of money and education; myths, religious beliefs; and lack of motivation and knowledge. He suggested providing more manpower and creating opportunity to build a comprehensive IYCF practices. In his views the situation was worse in control areas.

3.8. Financial

In the intervention area of Sylhet, majority of mothers faced financial problem due to their husbands' ignorance. Their husbands either worked in London (UK) or engaged in business, and they preferred formula foods or other infant formula rather than providing animal foods in complementary feeding.

In Chittagong and Dinajpur, several mothers mentioned that due to limited income, they could not buy fish and meat regularly but they provided at least an egg per week while most of the PKs and SSs in intervention areas informed the similar problem. A SK from Dinajpur mentioned,

Mothers at least try to feed one boiled egg if her husband was unable to buy animal food. *She observed that mothers would like to provide foods influenced by TV advertisement*, *but currently they were concerned and understood the importance of breast milk and providing animal foods in complementary foods and feeding to children after their counseling*. *In her catchment area*, *people had no financial constraint*, *but most of the mothers encountered problems with their family members*, *especially the elderly ones*. *In such situation*, *at first we counseled with the family members and tried to motivate in order to improve their awareness*.

In the control areas majority of the mothers' notion was to provide animal foods despite of income limitations. They opined that income problem was temporary and its solution depended on one's husband's ability or willingness; if earning increased they could provide more animal food to their children.

3.9. Social Barriers

It was found that in Dinajpur intervention areas mothers and PKs encountered some superstitions imposed by their neighbors regarding feeding fish and meat to their children. They prohibited feeding food from animal sources to children, because they believed it would be harmful to the baby. The family members supported and influenced as well not to provide those foods to the baby.

3.10. Domestic Barriers

Majority of the mothers from both intervention and control areas stated that they faced problems from their elderly family members. They tried to practice the traditional way for their grand children and forbidden feeding foods from animal sources that might cause worm, stomach problem, etc. A mother from Dinajpur said,

Sometimes I could not provide fish to the child, *though there was enough fish supply at home*. *Most of the time fish caused of dysentery*, *so I was rather not interested to give it to my child*.

If the mothers fed animal foods ignoring their elderly family members' advice and the children had any health

problem then the family members blamed them. So, they scared to follow the health workers' advice. A mother from Chittagong told,

They could not provide fish and meat even more food to the babies. *If the baby became sick*, *then everybody would blame her*.

3.11. Some Allegory

In Chittagong intervention area few mothers said that they could not provide egg which caused diarrhea. Also allegory existed on feeding liver. A mother said,

If they feed chicken liver then children's liver will be smaller and grow up as cowardice. *On the other hand*, *as they belief that a baby cannot digest egg and similar food; these may be the causes of diarrhea*.

Most of the PKs of Sylhet and Chittagong told that mothers believed that fish was harmful for children and caused worm. If they were fed more fish then the baby's belly would be enlarged. So, they could not provide animal food.

3.12. Others Barriers

In control areas, intake of animal food was found to be insufficient due to lack of knowledge. Most of the PKs from Sylhet and Chittagong stated that Hindu ritual *Annoprashon* was the most important to reduce intake of animal food as complementary due to most of the Hindu family could not break their rituals that delayed starting complementary foods. This might further delayed due to financial crisis, decision to perform the ritual by the household head or his absent from home, etc. As a result, late introduction of complementary food contributed in delaying in providing food from animal sources. In some cases, lack of mother's knowledge hindered intake of animal foods. Others were too busy with the HH chores that they did not get enough time to feed their babies. On the other hand, as they thought that due to providing animal food children defecated more, the mothers and family members got afraid and stopped feeding animal foods. Some mothers reported that due to providing animal foods like egg and meat to their children they faced some allergenic problems. In that case, they avoided all kinds of animal foods. Most of the health service providers mentioned that mothers complained that their children faced vomiting and worm problems after giving animal food.

The health service providers tried to counsel to mothers and also the family members that the problem encountered might not feeding animal foods, there might have some other reasons. Religious restriction was found in some areas where male POs were not allowed for supervision or counseling. On the other hand, in some areas fathers were idle/workless and even not thought about family planning; as a result they failed to provide enough animal food to their children. From shadowing, it was found that, the restrictions mostly came from husbands and relatives. In Barguna, husbands went for long period to work outside and returned home with lots of shop foods for their children and preferred to feed that. On the other hand, relatives also preferred to feed shop foods to their children while looking after them due to their mothers' HH chores. If any mother forbidden them, they did not care and sometimes might get angry. For that, most of the time, mothers didn't told anything. The mothers, who had their own sources of animal food, mostly preferred fish, egg in intervention areas and milk products in control areas. It was found in most the areas that mothers forgot to wash babies' and own hands with soap properly during feeding their children. As a result, the baby might have stomach problem or vomiting. The elderly and other family members including relatives suspected that it occurred due to feeding animal food. Then the mothers also believed them and frighten to feed the animal food again.

4. Discussion

During the period of complementary feeding, children more often develop under nutrition if not appropriately taken care of. According to the IYCF global strategy it also mentioned about safe complementary feeding practices after 6 months of age with adequate amount of energy, protein and micronutrients as appropriate for age [5] [6]. That is, the given foods need to be well diversified from all locally available foods groups. In the current study the findings overall suggested dietary intakes by the beneficiary children were though diversified but mainly with vegetables and other cereal based diets. Food consumption from animal sources was seemed to be lower in the age group 6 - 8 months compared to other age groups. Consumption of food by quantity was not at satisfactory level as well. This indicates that the diet might be of better quality, but the quantity was compro-

mised. There was no significance observed between intervention and control areas.

Animal foods are the main sources of quality protein required to make its provision in complementary diet for the child. 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 average 13% protein which came from animal sources (7%) and rest came from plant sources. Because mostly the respondent preferred egg and milk/milk product for children and then liver, fish and meat for feed among both areas. These also help for practicing bio-availability of protein sources. Evidence suggests that during complementary feeding practices plant sources are insufficient to meet the needs of some essential nutrients [2] [5] [6]. Diets that are for the most part based on grains and legumes contain adequate amount of micronutrients which bioavailability particularly, iron and zinc are poor due to the presence of large amount of phytates [5] [7]. However, bioavailability of nutrients from animal sources is higher compared to that of plant sources due to its limiting amino acids [8]-[10]. Hence, it is recommended to daily menu of complementary food diets consist of meat, poultry, fish or eggs [5].

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 study initiate that one of the obstacle was the myth and some ritual for the family to intake food from animal sourced especially for fish. Like mostly the myth was food from animal sources was not digestible by the children especially for the fish, along with though the child don't had teeth so he/she can't crush the food from animal sourced rather food from other sources like fruit, fiber, etc. A study showed that household daily income influences the food budget, particularly intake from animal sources due to costly [11] [12]. The barriers differed by regions. In Dinajpur, people had money and also had the ability to bought food from animal sources but they were less interested to provide food to the children from animal sources. And the reason behind that was while they started to feed from animal sources they found that the children suffered from dysentery and some other stomach problem, which frightening them to feed further food from animal sources. But in practical there was no scope for any kind of stomach problem due to food from animal sources.

We found unhygienic food preparation method or feeding or sanitation, etc may cause the problem. 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 London, 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 *cerelac* (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. The situation is better compared in intervention areas. Where we found that the consumption of milk or milk product was lower but the other sources of animal food like egg, fish, meat and liver was higher in the intervention areas compared to control areas. That means the intervention packages for appropriate infant and young child feeding practices was success in the programme areas where the special emphasis on feeding from animal sources was also pretty much succeed.

Limitations

Fathers' in-depth and FGDs could not be conducted in Barguna district due to their unavailability. During visit, they went to the sea for fishing for their livelihood.

5. Conclusion and Recommendation

5.1. Conclusion

In conclusion, it could be said that dietary diversification in the study areas was found to be noticeable in terms

of quality, but quantity was inadequate, hindering nutrient adequacy, specially protein and micronutrients from animal sources. Traditional practices, myth and taboos, prohibition of elderly family members, fathers, etc. still remained as barriers in providing animal foods to children as weaning and supplementary food. Efforts should be strengthened in awareness development process in creating demand for IYCF services at household level to improve children's nutritional status.

5.2. Recommendations

1) Special attention should be given in providing food from animal sources to children aged 6 - 8 months and should be continued until customized to family foods;

2) Traditional practices, myth and taboos, misconception and prohibition of elderly family members, fathers, etc. still remained as barriers in providing animal foods to children at weaning and supplementary stages. Initiatives need to be taken to minimize these barriers by more counseling and forum, meeting with the family members.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Contributions

All authors were equally involved in the conceptualization and design of the study. USM

Lead data collection, analysis and interpretation with substantive inputs from BC, US, RH and MUM. The paper developed with substantive input from BC and MUM.

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Acronyms

AED: Academy for Educational Development
AM: Area Manager
A & T: Alive & Thrive
BF: Breastfeeding
BM: Branch Manager
CF: Complementary Feeding
BHNPP: BRAC Health Nutrition and Population Programme
EBF: Exclusive Breastfeeding
FGD: Focus Group Discussion
HH: Household
IYCF: Infant and Young Child Feeding
PO: Program Organizer
PK: Pusti Kormi
RED: Research and Evaluation Division
SS: Shasthya Shebika
SK: Shasthya Kormi
UZ: Upazila