NUTRIENT COMPOSITION OF NINE FESTIVAL DISHES OBTAINED FROM A RECIPE SURVEY AMONG LOWER TO MIDDLE-CLASS HOUSEHOLDS IN SELECTED URBAN AREAS

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ABSTRACT

Background and Objectives: Estimation of nutrient content of a recipe by a recipe calculation method may be cost-effective and alternative to the chemical analysis for a range of applications, laboratory analysis of standardized recipes is considered a more authentic and accurate source of recipe nutrient data. Food composition data (FCD) regarding festival foods and dishes is very scanty in local and global food composition tables (FCT). The present study, thus, conducted a recipe survey on the ingredient profile of festival recipes consumed by lower to middle-income households in Bangladesh followed by proximate analysis of standard recipes obtained by collapsing similar recipes. Unanalyzed nutrients were obtained by data compilation from local and global food composition databanks (FCDB). **Methodology:** A cross-sectional recipe survey was conducted sequentially on festival foods and dishes among purposefully selected housewives residing at different areas of Dinajpur district and Dhaka city. The study instrument was a structured pre-tested questionnaire. Nine homemade festival recipes out of 40 recipes cited viz., plain polao, beef bhuna, fish fry, chicken bhuna, payesh, beef biriyani, chinese vegetable, chicken roast and baked fish were selected and standardized according to the method established in our laboratory. The selected recipes were prepared and analyzed for proximate composition along with an estimation of the cooking yield factor. Content of moisture, ash, protein, total fat, total dietary fiber (TDF), available carbohydrates, and calorie values of nine selected dishes were determined using standard operating procedures (SOP) established on the basis of AOAC methods. Precision and accuracy of analytical values were checked as part of Quality Assurance Program (QAP). Data compilation of missing values for vitamins and minerals was conducted according to FAO data compilation toolkit. **Result:** Moisture content ranges from 30.42-70.75%, protein content ranges from 2.60-35.70%, fat content ranges from 2.61-22.53%, ash content ranges from 0.6241-8.8%, TDF ranges from 0.58-8.49%, carbohydrates ranges from 0.65-45.7% and energy content ranges 101.5-368.4 kcal/100g fresh sample. The cooking yield ranges from 40.96-96.82%, which is highest in plain polao and lowest in fish fry. **Conclusion:** The data generated from this study can be used as reliable data which will enrich the national food composition table.

KEYWORDS: Festival dishes, Proximate composition, Food Compositional database, Citation, Standardized recipes.

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Introduction

A recipe analysis is the process of determining the nutritional content of a recipe or food product. In fact, recipe analysis offers a cost-effective alternative to detailed chemical analysis and is indeed the method most widely used and accepted in a range of applications. There are, however, many challenges in recipe analysis, including sourcing appropriate nutrient values, converting ingredient quantities from units and household measures to weights, and assigning weight change factors (Church, 2015). In addition, robust food composition data (FCD), cooking yield data, nutrient retention data, accurate serving size, etc. are needed to calculate reliable recipe data for foods and dishes. FCDs are, in general, classified into different types based on the method used to collect or acquire the data. There are five recognized types, namely, analytical, copied or borrowed, calculated, imputed and presumed or assumed data. A combination of these methods is often used to create national or regional FCDBs (Kapsokefalou et al., 2019). The FCDs that are available in Bangladesh are usually constructed by a combination of different methods (FCTB, 2013; DKPM, 1977). Moreover, they lack data on cooked foods and recipe composition. Home preparation of food remains an unpredictable process causing notable variations in the nutrient composition of recipes after cooking. On the other hand, recipe calculation from nutrient values of raw ingredient may provide different kind of data than those from direct chemical analysis. This is because of variations in local recipe composition, cultural, ethnic and religious cooking practices, local ingredients, etc. (Gopalan, 1971) (Puwastien, P, 2000)

(UNICEF, Islamabad, Pakistan, 2001). It is, therefore, still relevant to generate analytical data on recipes as they are known for being the most accurate. These types of data are generated from foods and dishes that are commonly consumed in a particular region and prepared according to customary cooking traditions. Ideally, representative samples collected from selected foods are analyzed using standardized chemical methods.

Bangladesh has a culture full of festivals which now become an essential part in the lives of the lower to middle income population of Bangladesh due to its recent economic growth (Rahman, 2012). Traditional festival dishes are the main attraction of all these events. Bangladesh has a rich history of various traditional dishes specific to festivals.

Nutrient concentration in recipes usually prepared and consumed by Bangladeshi people have been chemically analyzed in our laboratory for more than 20 years. As a continuation of these studies, a recipe survey has been conducted among selected lower and middle-income households located in Dinajpur district and Dhaka-city Bangladesh to collect recipes on festival dishes followed by a standardization protocol established in our laboratory.

The recipes were: plain polao, beef bhuna, fish fry, chicken Bhuna, payesh, beef biriyani, Chinese vegetable, chicken roast and baked fish. Laboratory analysis for proximate composition of these standardized recipes was carried out. All analytical SOPs were AOAC listed methods. Pre and post cook weight differences were used to calculate the percentage of cooking yield. Due to exceeding analytical costs, the vitamin and mineral contents of the selected recipes were compiled from local, regional, and global FCDBs by the FAO/INFOODS data compilation toolkit online (accessed on February, 2024).

Materials and Methods

Recipe collection survey

The survey was conducted using a pretested survey questionnaire by face-to-face interviewing 110 participants from lower to middle-income households residing in Dinajpur town and Dhaka city on the basis of their oral consents. The mothers were asked to describe at least 5 recipes they used to prepare along with ingredients and amounts used for these recipes using a pre-tested questionnaire, which was established in our several studies (Ara, 2004) (Jahan, 2005) (Arjoo, 2005) (Mustary, 2009) (Mahbuba, 2018). Also collected was the information on seasonality, availability, and preparation frequency of the foods they consumed in order to develop a key food list. Other relevant information regarding recipe preparation was also collected. A similar recipe from a cookbook (Kabir, 1983) was also extracted to obtain a comparison.

Selection and Standardization of recipes

Standardization of recipes was conducted as per the protocol established and validated in our laboratory over time (Ara, 2004) (Jahan, 2005) (Arjoo, 2005) (Mustary, 2009) (Mahbuba, 2018). Briefly, the name, amount, size, and volume of each ingredient of each recipe were listed on the basis of proportion of the total citation percentage. Those recipes were considered to be listed which have a cutoff citation percentage ≥ 3. Next, the mode of an ingredient and its corresponding amount in gram or serving size was coined for making a standardized recipe for the representation of all the recipes listed. The cutoff point of citation percentage was determined for each category of recipes on the basis of minimum ingredients necessary for making a recipe so that the preparation cost of the recipe stands at a minimum and is within the economic reach of the participant household.

Preparation for laboratory analysis of selected standardized festival dishes

The ingredients of the selected standardized recipes were purchased from the local markets and were used immediately for food preparation. If the selected recipes involved cooking, then the ingredients were adjusted for cooking effects like boiling, baking, frying, etc. Recipe weight before and after cooking were recorded to calculate cooking yield factors according to Bognar and Piekarski (2000). Samples were blended immediately after preparation and portions of cooled samples were immediately analyzed for moisture contents (NIN, 2003). The rest of the samples were oven dried at $65^0 \pm 5^0$ C for 12-14 hours, powdered and stored in desiccators until use.

Table 1. Ingredients used in standardized Festival Recipes

Food Items	Ingredients (g) and Preparation procedure (PP)	Total weight (gram)
1.Plain polao	Rice, white, sunned 155.96 g, salt 2.31 g, Soyabean oil 19.88 g, cardamon 0.71 g, Bay leaf 0.4g, Onion 18.01 g, Ginger 1.67 g, Cinnamon 0.44 g, Garlic 2.1 g, green chili 2.11 g, Water 350 g PP: Firstly, sliced onion was fried in soyabean oil until brown and then it took out from the pan. Other spices (cardamon, bay leaf, cinnamon, garlic ginger paste) including soaked atop rice were put together and cooked for 5 minutes then added with previously boiled water. The rice was cooked for 10 minutes and fried onion was spread on the cooked rice to furnish the dish.	**553.59 g**
2. Beef Bhuna	Beef meat 397.8 g, Onion 54.54 g, salt 5.70 g, soyabean oil 49.44 g, Garlic 5.84 g, ginger 4.84 g, Turmeric 6.58 g, chili powder 9.52 g, cumin 3.38 g, spices 8.32 g, Bay leaf 0.90 g, Water 300g PP: Beef bhuna was cooked by putting all ingredients (beef, onion, garlic, ginger, turmeric, pepper, cumin, spices, bay leaf, oil and salt) in a pan and mixed well. Also, water was added and cooked until beef is properly cooked.	**846.86 g**
3. Fish Fry	Fish 160 g, turmeric 6 g, chili powder 6.12 g, salt 6.12 g, soyabean oil 128.4 g PP: Fish was mixed with all ingredients (turmeric, pepper, salt) and fried in hot oil until brown.	**306.64 g**
4. Chicken Bhuna	Chicken meat 366 g, Onion 49.8 g, garlic 5.22 g, ginger 4.2 g, turmeric 6.3 g, chili powder 9.3 g, salt 5.54 g, soyabean oil 43.26 g, spices 7.82 g, water 150 g PP: Chicken bhuna was prepared as same as beef bhuna using the ingredients (chicken meat, onion, garlic, ginger, turmeric, pepper, salt, oil, spices).	**647.44 g**
5. Payesh	Rice, white, sunned 35.28 g, sugar 65.63 g, milk 302.57 g, cardamon 0.62 g, Bay leaf 0.35 g, Raisin 5.38 g, cinnamon 0.39 g, Salt 0.92 g PP: Payesh was made with atop rice, milk and other ingredients (sugar, cardamon, raisin, cinnamon, bay leaf). Milk and other ingredients except sugar were added to the saucepan. When the rice was boiled, sugar was added and cooked for 5 minutes in medium heat.	**411.14 g**
6. Beef Biriyani	Rice, white, sunned 150 g, beef 100 g, onion 25 g, soyabean oil 25 g, chili powder 1 g, cardamon cinnamon bay leaf 2 g, garlic-ginger paste 5 g, salt 2 g, water 400 ml PP: At first, rice was washed properly and soaked for hours. Chopped onion, garlic, ginger were blended together with water and fried it with oil in a pan until it became brown. Then the meat cubes were added and cooked for few minutes. While meat was cooking, sliced onion with other ingredients (cinnamon. cardamon, garlic ginger paste) was fried in another pan and then soaked rice was added and cooked for 10 minutes. Then the rice was put on the top of the meat and covered with a lid. After baking 30 minutes in low flame, the biriyani was ready to serve.	**710.00 g**
7. Chinese Vegetables	Papaya 350 g, Palau 420 g, Carrot 250 g, Onion 30 g, Chicken cube 45 g, oil 15 g, Corn flour 10g, Green chili 1 g, Salt 2 g, Water 180 ml PP: Firstly, sliced vegetables and chicken cubes were half boiled separately. Onion and green chili were fried in a pan with oil and the half-boiled vegetables, chicken cubes, salt, corn flour were added to the pan and cooked for half an hour. Thus, Chinese vegetables was prepared.	**1303.0 g**
8. Chicken Roast	Chicken meat 365 g, Onion 250 g, Green chili 2 g, oil 50 g, Chili powder 5 g, Cardamon cinnamon Bay leaf 2 g, Garlic-ginger paste 5 g, coriander powder 9 g, Sugar 5 g, Salt 5 g, Water 50ml PP: Chicken meat was washed properly and fried with soyabean oil. Other ingredients were fried together until they became brown and then the fried chicken was added to the pan, cooked for few minutes and sugar was added with the meat.	**748.00 g**
9. Baked Fish	Boneless Ruhi fish 300 g, Onion 100 g, Green chili 30 g, flour 200 g, Egg 90 g, Coriander powder 20 g, Garlic-ginger paste 15 g, Salt 5 g, Oil 20 g, water 120 ml PP: Boneless Ruhi fish was boiled until it became soft. Other ingredients (onion, green chili, flour, egg) were taken in a bowl and mixed with boiled fish properly. Small balls were made and fried on preheated oil until it became brown.	**900.00 g**

Preparation of laboratory sample

Samples of each item were blended to make a homogenous mixture (Suzanne, 1994). Portions of each item were removed for moisture and ash analysis. Homogenous samples were then dried at $65^0 \pm 5^0$C in a laboratory oven for overnight followed by crushing into powder with the help of an electric kitchen mixture. Powdered samples were passed through a 40 mm sieve to prepare even-sized particles (Waksman S.A., & Steven K.R., 1930).

Proximate analysis

Homogenous dried samples in sachets were taken out from desiccators for proximate analysis. Official Methods of Analysis (OMA) of AOAC (2000) was used in most cases

(AOAC, 2017). Moisture free samples were analyzed for ash, protein (OMA 984.13), and fat (OMA 922.06 & 991.36 on sample basis). For determination of total dietary fiber (TDF), adoption of the Prosky method (OMA 985.29) was used because it supports the Trowell's definition of TDF (McCleary, 2023).

The nitrogen free extracts (NFE) were considered as total carbohydrate and were calculated by the following equation:

Cooking yield determination

The cooking yield was defined by Bognar (Bognar, 1998) and measured as the following equation. Yield factor provide information on weight changes during the food preparation, either water absorption during cooking or water loss (McCarthy M.A., 1992).

$$Cooking\ yield\% = \frac{weight\ of\ food\ after\ cooking\ in\ g}{wight\ of\ food\ before\ cooking\ in\ g} \times 100$$

Quality Assurance Program (QAP)

For each analytical methods, coefficient of variation (CV) was determined in a quantitative manner as an index of precision; a CV <10% was taken as acceptable. On the other hand, instead of commercial reference materials, an in-house-reference material (IHRM) was used to check the accuracy of nutrient values of the foods analyzed by co-analysis of a portion of IHRM in each batch of analysis. Accuracy of each estimated value was determined by comparing with the temporal chart of IHRM values kept in our laboratory.

carbohydrate (g/100g) = 100 - (moisture + protein + lipid + dietary fiber + ash) g/100 g. Energy content of each HMRI was calculated by using Atwater Factors (Atwater WO, 2010): the metabolizable energy (MEn) for carbohydrate (c), MEc = 4 kcal/g; for fat (f), MEf = 9 kcal/g; and for protein (p), MEp = 4 kcal/g. All samples were analyzed in duplicate with duplicate triplicate or quadripartite estimations for each parameter.

Data compilation for vitamin and mineral values

Unanalyzed nutrient values i.e., contents of vitamins and minerals were compiled from various local (Shaheen N et al., 2013), regional (Longvah T. et al., 2017), and global datasets by using the FAO/INFOODS Data Compilation Tool version 1.2.1. (FAO/INFOODS cited 2023). Final value of each calculated nutrient value was adjusted for water and fat corrections.

Results

Socio-demographic features of the respondents

The socio-demographic profile of respondent housewives participated in the recipe survey are presented in Table 3.

Survey results and recipe profiles

A total of 40 festival recipes (FRs) were cited by the respondents, which they prepare at home occasionally for the consumption of household members or to entertain guests. The total number of citations of all cited festival dishes was 500 (Table 3).

Table 2. Characteristics of recipe survey respondents (N=100)

Characteristics	Percentage (%)
Age (years)	
20-30	24
>30	**76**
Education	
>Graduate	11
Graduate	24
H.S.C	24
<H.S.C	**41**
Profession	
Housewife	**81**
Working	08
Student	11
Family income (Tk)	
5000-15000	26
More than 15000	**74**

Nine recipes were selected and standardized for proximate analysis which were not previously analysed. The selected FRs include Plain polao (11.2%), Beef bhuna (8%), Fish fry (7.6%), Chicken Bhuna (6%), Payesh (5.6%), Beef biriyani (4.6%), Chicken roast (4.6%), Chinese vegetables (4.4%) and Baked fish (4.0%).

Analysis of proximate nutrients

Since the analyses were performed on dry weight basis, final results were prepared by adding water content into per 100 g of each sample and treated as fresh. Proximate nutrient profile is given in Table 4.

Table 3. Frequency of Festival Dishes Citation by Respondents

Food Items	Citation No.	% of Total Citation
Plain polao	56	11.2
Beef bhuna	40	8.0
Fish fry	38	7.6
Chicken Bhuna	30	6.0
Payesh	28	5.6
Beef Biriyani	23	4.6
Chicken roast	23	4.6
Chinese vegetables	22	4.4
Fish kofta	20	4.0
Egg kourma	18	3.6
Chicken biriyani	15	3.0
Kabab	12	2.4
Beef curry	11	2.2
Prawn dopiaza	10	2.0
Mutton rezala	10	2.0
Bhuna khichuri	10	2.0
Fried chicken	10	2.0
Motor polao	10	2.0
Hilsha dopiaza	9	1.8
Fried rice	8	1.6
Total citation of all 40 food items is 500.		

Table 4. Energy and Proximate nutrient value of cooked recipe (g/100g ED) with cooking yield (%)

Food Items	Moisture	Ash	Protein	Fat	Available CHO	TDF	Energy (kcal)	Cooking yield (%)
Plain polao	68.07 ± 0.19	0.62 ± 0.05	2.60 ± 0.12	2.61 ± 0.05	25.16	0.94 ± 0.23	136.41	96.82
Beef bhuna	53.55 ± 0.32	2.61 ± 0.14	21.37 ± 1.79	17.35 ± 1.1	4.21	0.91 ± 0.03	260.29	59.28
Fish fry	32.38 ± 0.20	8.8 ± 0.73	35.70 ± 1.03	21.88 ± 0.92	0.65	0.59 ± 0.07	343.50	40.96
Chicken bhuna	59.58 ± 0.23	2.81 ± 0.04	20.28 ± 0.79	11.59 ± 0.91	5.11	0.63 ± 0.09	207.13	66.11
Payesh	45.15 ± 0.59	1.16 ± 0.01	4.12 ± 0.17	3.29 ± 0.207	45.7	0.58 ± 0.02	230.05	73.73
Beef biriyani	60.57 ± 0.25	2.49 ± 0.05	18.04 ± 1.50	4.5 ± 0.37	10.14	4.26 ± 0.05	161.74	72.54
Chinese Vegetable	70.75 ± 0.29	5.04 ± 0.19	6.83 ± 0.85	4.8 ± 0.29	2.91	9.67 ± 0.13	101.50	80.20
Chicken roast	30.42 ± 0.33	4.02 ± 0.25	32.87 ± 1.15	22.53 ± 0.45	6.9	3.26 ± 0.16	368.37	76.87
Baked fish	40.52 ± 0.15	2.74 ± 0.09	25.66 ± 0.77	15.79 ± 0.97	6.8	8.49 ± 0.08	288.93	70.00

* ED, Edible portion
[§] Results are expressed as mean of triplicate estimations **± SD**
[¶] Carbohydrate and energy are calculated from the mean value of each sample.

Compilation of unanalyzed minerals and vitamin

Unanalyzed nutrient values, vitamins and minerals were compiled from various local, regional, and global datasets using the FAO/INFOODS Data Compilation Tool version 1.2.1. Quality checks were applied throughout the compilation process by applying FAO/INFOODS Guidelines. Since each compiled value was adjusted for water and fat in order to harmonize with the proximate values, variations from real values have been expected to be insignificant. (Table 5 & 6)

Table 5. Mineral profile of Festival Dishes after compilation of analytical, calculated, and reference nutrients data

Food Code	Food Name	CA (mg)	FE (mg)	MG (mg)	P (mg)	K (mg)	NA (mg)	ZN (mg)	CU (mg)
		Calcium	Iron	Magnesium	Phosphorus	Potassium	Sodium	Zinc	Copper
1	Plain Polao	**6**	**0.4**	**16**	**39**	**27**	**167**	**0.34**	**0.05**
2	Beef Bhuna	**24**	**1.82**	**25**	**165**	**320**	**211**	**4.9**	**0.03**
3	Fish fry	**48**	**2.5**	**73**	**211**	**296**	**345**	**1.96**	**0.52**
4	Chicken bhuna	**41**	**2.32**	**22**	**112**	**218**	**356**	**0.6**	**0.08**
5	Payesh	**132**	**0.2**	**31**	**120**	**169**	**65**	**0.65**	**0.11**
6	Beef Biriyani	**24.00**	**1.82**	**25**	**165**	**320**	**211**	**4.9**	**0.03**
7	Chinese vegetable	**19**	**0.70**	**18**	**120**	**340**	**320**	**0.7**	**0.11**
8	Chicken Roast	**68**	**0.48**	**20**	**170**	**261**	**218**	**1.0**	**0.06**
9	Baked Fish	**48**	**2.5**	**73**	**211**	**296**	**345**	**1.96**	**0.52**

Table 6. Vitamins profile of Festival dishes after compilation of analytical, calculated, and reference nutrient data

Food Code	Food Name	VITA_RAE (mcg)	RETOL (mcg)	CARTBEQ or [CARTB] (mcg)	VITD (mcg)	VITE or [TOCPHA] (mg)	THIA (mg)	RIBF (mg)	NIAEQ or [NIA] (mg)
		Vitamin A	Retinol	Beta-carotene equivalents, or [beta-carotene]	Vitamin D	Vitamin E, or [alpha-tocopherol]	Thiamin	Riboflavin	Niacin equivalents, or [Niacin]
1	**Plain Polao**	**0.00**	**0.00**	**0.00**	**-**	**-**	**0.01**	**0.01**	**1.3**
2	**Beef Bhuna**	**-**	**20.63**	**126.18**	**-**	**-**	**0.06**	**0.19**	**6.50**
3	**Fish fry**	**272.68**	**75.11**	**395.15**	**0.65**	**-**	**0.24**	**0.15**	**2.0**
4	**Chicken bhuna**	**87.81**	**17.74**	**140.74**	**-**	**2.50**	**0.05**	**0.07**	**4.30**
5	**Payesh**	**26.60**	**26.60**	**0.00**	**-**	**0.18**	**0.07**	**0.33**	**0.00**
6	**Beef Biriyani**	**-**	**Tr**	**30.59**	**-**	**-**	**0.06**	**0.19**	**6.50**
7	**Chinese vegetable**	**11.29**	**11.29**	**0.00**	**-**	**-**	**0.26**	**0.16**	**9.10**
8	**Chicken Roast**	**112.65**	**112.65**	**0.00**	**-**	**3.23**	**0.06**	**0.20**	**8.50**
9	**Baked Fish**	**196.79**	**54.20**	**285.16**	**0.47**	**-**	**0.24**	**0.15**	**2.0**

Discussion

Food preparation at home always remained an unpredictable process. Loss of water, decomposition of protein, fat evaporation, losses mineral and water-soluble vitamin through leaching, soaking, and extraction are common during food processing and preparation. The availability of some nutrients might also change in either a positive or a negative way. Lack of FCD on recipes prepared by traditional cooking procedure restricts the assessment of diet-health relationships. Without such FCD, the evaluation of individual dietary consumption within the population becomes difficult (Emily F et. al., 2017) (Ferrari P et. al., 2008). To ease this difficulty, production of valid FCD is very critical. So far, no study in Bangladesh dealt with constructing recipe composition table with cooked foods "as consumed" by our population. To fill the information gap on FCD for cooked foods and dishes consumed by the Bangladeshi people, a number of foods and dishes are being analyzed for their proximate compositions in our laboratory since 2003 and onwards. In a continuation of these studies, the present study presented proximate nutrient data analyzed value of nine previously selected and standardized festival dishes.

Firstly, a recipe survey was conducted using a pre-tested questionnaire and nine festival dishes were selected from 40 FDs mostly cited by the respondents in order to analyze the proximate composition. As socio-demographic conditions affects the food consumption and nutrient variety in daily household food intake, the characteristics of the respondents were recorded. The majority of the participants were nonworking housewives (81%) aged 30 years old and above (76%. It is also notable that most of the respondents were belonged from moderately solvent family (74%). (Table 3)

The recipes of nine selected FDs were collected and standardized the recipes according to the method established in our laboratory. The study depicts the content of moisture, protein, total fat, ash, TDF, available carbohydrates, as well as calorie values of nine selected dishes. Moisture content MIFs ranges from 30.42-70.75%, protein content ranges from 2.60-35.70%, fat content ranges from 2.61-22.53%, ash content ranges from 0.6241-8.8%, TDF ranges from 0.58-8.49%, carbohydrates ranges from 0.65-45.7% and energy content ranges 101.5-368.37 kcal/100g fresh sample. (Table 5) It is remarkable that the content of protein (35.70%) and ash (8.8%) of fish fry is the highest as is the content of fat (22.53%) and energy content (368.37kcal) of chicken roast. As deep fat frying produces dehydration of the food and concentrates the nutrient content in dried foodstuffs.

The cooking yield factor shown in Table 5 indicates that these factors depend on the types of ingredients of the dishes as well as on the types of cooking procedure. The cooking yield ranges from 40.96-96.82%, which is highest in plain polao and lowest in fish fry because the cooking yield of fish fry is calculated by subtracting the leftover oil after deep frying the fish from the total raw ingredients weight.

Moreover, precision and accuracy of analytical values were checked as Quality Assurance Program (QAP) (Taylor, J.K., 1987) (Mandel, J & Nanni, LF, 1978). Co-efficient of variation (CV) was used an index precision and proximate composition of IHRM (Cooked Rooti) was used to evaluate the accuracy. The nutrient data of the selected recipes has been judged quality data by their precision and accuracy level and therefore, are considered to be reliable.

Conclusion

In an attempt to partially fill the information gap on compositional data for cooked food consumed by the Bangladeshi population, the present study was conducted to collect, process and analyzed nine selected festival dishes as being among the most commonly consumed which resulted from a survey conducted among 110 housewives residing in different areas of Dinajpur district and Dhaka city. Thus, the findings of the study comprised a nutrient composition table of nine selected recipes thereby supplementing the food composition database of Bangladesh. The quality of the data generated from this study was high as it were precise and valid.

Limitation of the study

There are also some limitations in this study. 1) After data cleaning, the total respondents were reduced from 110 households to 100. If the sample size was higher, the total citation percentage would be higher and standardization would be better. 2) Due to insufficient and advanced instruments and reagents, vitamins and minerals were not being directly estimated, obtained by compilation.

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