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**A NOTE ON THE PROCEDURE OF
ESTIMATION OF CALORIE &
PROTEIN CONSUMPTION LEVEL
FROM THE INFORMATION COLLEC-
TED IN CONSUMER EXPENDITURE
SURVEY, NSS 26TH ROUND**



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A NOTE ON THE PROCEDURE OF ESTIMATION OF CALORIE &
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ECTED IN CONSUMER EXPENDITURE SURVEY, NSS 26TH ROUND

1. At the request of Food and Agriculture Organisation of the United Nations (FAO), the National Sample Survey Organisation (NSSO) recently took up tabulation programme for obtaining the calorie values of the energy-yielding components of food consumed in the country in recent period. The basic information needed for deriving the required results were taken from the consumer expenditure schedule of the NSS 26th round (July 1971 - June 1972). As the NSS survey was not primarily planned as a nutrition survey, the main bulk of the tabulation work and the principal problem of computation consisted in conversion of quantity data of food consumption to the corresponding energy units. In this note, the list of calorie and protein conversion factors for different food items and the procedure for deriving those have been presented.

2. Tables are to be prepared separately for the rural and urban areas of each state and union territory of India. The households are classified by per capita monthly expenditure group and the amount of calorie intake per consumer unit per diem group. For each of these group of households the table shows -

- (a) number of households in the sample;
- (b) average size (number of persons) of household;
- (c) number of consumer unit per household;
- (d) percentage of calorie intake from five broad food groups; and
- (e) average intake of calorie and protein (gm.) per consumer unit per diem.

3. For the classificatory items the following sets of groups were used in tabulation :

A. Calorie intake per diem per consumer unit group

- (1) upto - 1500, (2) 1500 - 1700, (3) 1701 - 1900, (4) 1901 - 2100,
- (5) 2101 - 2300, (6) 2301 - 2500, (7) 2501 - 2700, (8) 2701 - 3000,
- (9) 3001 - 3500, (10) 3501 - 4000, (11) 4001 & above and
- (12) all groups.

B. Per capita monthly consumer expenditure (in rupees) group

- (1) 00 - 15, (2) 15 - 21, (3) 21 - 24, (4) 24 - 28, (5) 28 - 34,
- (6) 34 - 43, (7) 43 - 55, (8) 55 - 75, (9) 75 - 100, (10) 100 and above and (11) all classes;

[00-15 means 00-14.99, 15-21 means 15-20.99 and so on]



C. Food groups

- I. cereals, potato, sugar, jaggery and cereal substitutes;
- II. pulses, nuts and seeds;
- III. milk and milk products; meat, egg and fish;
- IV. edible oils;
- V. fruits, vegetables, spices and prepared food.

4. Data source : As already stated, the information collected in the consumer expenditure survey of the NSS twentysixth round were used. Information on the subject in the round were collected from 4548 villages and 4032 urban blocks. In each sample village and sample block, 4 households were surveyed on an average. The value and quantity of food consumed by a sample household during a period of 30 days preceding the day of enquiry was noted for 100 food items. For the purpose of tabulation, the food quantities have been converted into their equivalent calorie and protein content.

5. Conversion factors : The factors used for converting the quantity estimates of different food items into their respective calorie and protein equivalents were generally taken from a bulletin of the Indian Council of Medical Research^{1/} and few others were taken from those used in the study conducted by IITM on behalf of USAID^{2/}. While for a number of items the conversion factors were directly available from the Bulletin, for the other items recourse to some indirect methods had to be taken. In fact, the consumption data recorded in NSS schedules, for a large number of food items, are not straightway amenable to direct conversion into calorie terms. Indirect approaches had to be adopted by using results of some other studies. The nature of problems that were to be resolved while deriving the appropriate conversion factors are enumerated below :-

- (a) In the schedule of enquiry there was only one item as 'fresh fish'. But there is quite a large number of varieties of fish which are consumed by the people of the country. While one variety may have popular acceptance in one region another type may be more liked in some other region. The quantity available for consumption of a particular variety will also vary to a large extent from region to region. Neither the proportion edible nor the calorie and protein content for those different varieties of fish are the same.

1/ W.R. Aykroyd, C.Gopalan and S.C. Balasubramanian - "The Nutritive value of Indian Foods and the Planning of Satisfactory Diets", Indian Council of Medical Research (1966).

2/ Factors were derived by actual weighing in the survey conducted by M/S. Hindustan Thompson Associates (on behalf of USAID). The summary results have been published in the NSS Bulletin.

- The observed differences in the respective proportions of the nutrients are quite large among certain varieties. Hence, some amount of arbitrariness in determining the conversion factors for an item like 'fresh fish' can not be avoided.
- (b) The 'standard unit' for some items like 'banana', 'coconut', 'mango', 'pineapple' etc. is 'number'. But the equivalence chart presents, for obvious reasons, the number of calories and weight of protein per 100 gms. of edible portion. There is a number of variety of banana which vary in size (hence in weight) and the calorie and protein content per unit of weight of each variety may also differ. The proportion edible need not be necessarily the same also. To derive the calorie and protein value of such an item, taking into consideration the relative effects of all these variables would pose serious problems.
- (c) For some miscellaneous items like 'other fruits', other vegetables etc., no direct procedure can be applied for assessing their food values. For some such items the quantity data are not recorded. Units being different (for some items weight and for others number) for the constituents of those miscellaneous categories, aggregation of quantity data was not possible. Even if quantity data were available, those would have been of very little use.
- (d) Other composite items like 'cooked meals', 'ice cream', 'prepared sweets', 'snacks', 'pickles', 'jam, jelly etc. pose more serious problems. The constituents of such an item may vary within widely apart limits and in effect wide divergence in energy value per unit quantity of two samples of the same item may occur.

6. Derivation of conversion factors ; From the total number of 101 items listed under food group for the purpose of consumer expenditure schedule of the NSS twenty sixth round, 'tea leaf', 'coffee powder' and other beverages' were left out. Out of the remaining 90 items, calorie and protein content could be directly estimated from the nutrition table for 56 items. For the rest of the items (42 in number) indirect methods had to be applied due to the difficulties already enumerated. It is of course worth noting here that the weightage for most of the items in the last group is generally low as compared to those covered by the second category. Hence even if there is any element of error in estimation of energy equivalence of any of those items for which indirect procedure of estimation had to be adopted, its effect would be very little on the

total caloric and protein consumption. From the results of the NSS twenty-fifth round, July 1970 - June 1971, it was observed that the items of food amenable to direct conversion, covered about 67 percent of the total expenditure on food in rural areas and 72 per cent of that in urban areas.

7. Procedure of estimation of conversion factors : For difference in nature of the problems involved in the derivation of the conversion factors for different items, the procedures for estimation of the factors could not be kept uniform. Enumerated below are the methods applied according to the nature of problem involved in derivation of the factors.

- A. Where an item was found to be the same as an item in the list for which the conversion factors are readily available and the units are also the same for both, the standard factors were directly applied.
- B. Where the conversion factors per unit weight were directly available from the table but the unit of data collection is number, results of other studies were used.
- C. Where the quantity is standard unit but being a residual item like 'other milk products', its direct conversion to energy value was not possible. In such cases the value and quantity data for the identifiable items in the particular group was used. The procedure followed to derive indirectly the conversion factors for the item 'other milk products' is summarised below :
 - (i) the quantity and value data were pooled over a small sample of households, randomly selected from each of the states, separately for the items - milk (liquid), condensed and powdered milk, ghee, butter and curd;
 - (ii) the quantity data for the above mentioned identifiable items were then converted into the respective caloric and protein values by using standard factors. The total money value of these items were directly available from the data;
 - (iii) quantity of protein and number of calories per rupee were then derived from the pooled data for all the identifiable items in the milk group;
 - (iv) the value data for the item 'other milk products' of the group was then converted into caloric and protein, assuming that the same number of calories and gms. of protein would also be available for one rupee as those were found to be in (iii).
- D. There are some items like 'prepared sweets', 'salted refreshments' etc. for which the dimension of the conversion factors could not easily be derived. The recipe of some popular varieties were first ascertained. The ingredients used for preparing those

items were converted into equivalent numbers of calories and grammes of protein. The average price for such varieties were ascertained. Thus the amount of calorie and protein derivable from such items per rupee spent were estimated^{4/}.

E. The calorie and protein content of a cooked meal was assumed to be 1200 calorie and 40 gms. of protein, so that two meals would approximately provide the per diem requirement of proximate principles for one consumer unit.

F. There is not much nutritional value in coffee powder and tea leaves as such. The nutritive value of prepared coffee and tea really is due to the milk and sugar used in the preparation^{5/}. Hence the calorie and protein content of a cup of coffee or tea were estimated from the quantity of milk and sugar usually added to a cup.

G. Items like 'fish', dry fish etc., are no better than the miscellaneous items for the purpose of ascertaining the nutritive values. Here the average values of calorie and protein per unit of quantity for some popular varieties have been used. The quantity of protein so derived was of the order of 14 per cent of the gross weight of fresh fish. If only the edible portion of fish is taken, the proportion of protein is nearly 20 percent^{6/}.

G. The chart showing the nutritive equivalence ratios adopted for the purpose of converting food consumption data from NSS is given in the Appendix.

4/ Adoption of such procedure has also been suggested in "Programme of Food Consumption Surveys" - Food and Agriculture Organisation of the United Nations, Rome 1964.

5/ K. Srilekshmi - "Food and Health", National Institute of Indian Council of Medical Research, Hyderabad 1967.

6/ Protein content of fresh fish has been observed to vary between 15 and 23 percent of the edible portion : Maxine E. McDivitt & Sumati R. Mudambi - "Human Nutrition Principles and Applications in India" (1969).

Appendix

CHART SHOWING PROTEIN AND CALORIE CONTENT PER UNIT QUANTITY OF FOOD (EDIBLE PORTION ONLY) ITEMS ENLISTED IN THE CONSUMER EXPENDITURE SCHEDULE OF NSS 26TH ROUND

food item	unit	no. of calories per unit	protein per unit (in gm.0.0)	food group
(1)	(2)	(3)	(4)	(5)
<u>GRAINALS</u>				
Rice and its products	Kg.	3400	75.0	I
Wheat and its products	Kg.	3460	110.0	I
Jowar and its products	Kg.	3490	104.0	I
Bajra and its products	Kg.	3032	97.4	I
Maize and its products	Kg.	3420	111.0	I
Ragi and its products	Kg.	3200	73.0	I
Barley and its products	Kg.	3360	115.0	I
Small millets and its products	Kg.	2615	97.2	I
Gram and its products	Kg.	3600	171.0	I
Cereal substitutes	Kg.	1100	16.0	I
<u>PULSES</u>				
Arhar	Kg.	3350	223.0	II
Gram (split grain)	Kg.	3720	200.0	II
Moong	Kg.	3400	245.0	II
Masur	Kg.	3430	251.0	II
Urd	Kg.	3470	240.0	II
Khesari	Kg.	3450	202.0	II
Pea	Kg.	3200	200.0	II
Soyabean	Kg.	4320	432.0	II
Other pulses	Kg.	3400	220.0	II
Pulse products	Kg.	3400	220.0	II
<u>MILK AND PRODUCTS</u>				
Milk (liquid)	Kg.	1000	40.0	III
Baby food	Kg.	3570	300.0	III
Milk (condensed, powdered)	Kg.	4960	250.0	III
Ghee	Kg.	8750	-	IV
Butter	Kg.	7290	-	IV
Curd	Kg.	600	31.0	III
Other milk products	Ro.	800	20.0	III

food item	unit	no. of calories per unit	protein per unit (in gm.0.0)	food group
(1)	(2)	(3)	(4)	(5)
<u>EDIBLE OILS</u>				
Vanaspati	Kg.	9000	-	IV
Mustard oil	Kg.	9000	-	IV
Coconut oil	Kg.	9000	-	IV
Gingelly oil	Kg.	9000	-	IV
Groundnut oil	Kg.	9000	-	IV
Linseed oil	Kg.	9000	-	IV
Refined oil	Kg.	9000	-	IV
Edible oil (others)	Kg.	9000	-	IV
Oil seed	Kg.	5410	220.0	II
<u>MEAT, EGG & FISH</u>				
Goat meat	Kg.	1100	214.0	III
Mutton	Kg.	1940	105.0	III
Beef	Kg.	1140	226.0	III
Pork	Kg.	1140	107.0	III
Buffalo meat	Kg.	060	194.0	III
Other meat	Kg.	900	100.0	III
Poultry	No.	709	169.0	III
Other birds	No.	709	169.0	III
Egg	No.	100	74.5	III
Fish (fresh)	Kg.	1050	140.0	III
Fish (dry)	Kg.	3000	650.0	III
<u>VEGETABLES</u>				
Potato	Kg.	970	16.0	I
Onion	Kg.	540	15.0	I
Tomato	Kg.	200	9.0	V
Brinjal	Kg.	210	12.7	V
Cabbage	Kg.	230	15.6	V
Cauliflower	Kg.	210	10.2	V
Root vegetables	Kg.	600	25.0	I
Leafy vegetables	Kg.	550	40.0	V
Other vegetables	Kg.	700	40.0	V
<u>FRESH FRUITS</u>				
Banana	No.	04	0.0	V
Orange, Lemon	No.	50	0.9	V
Mango	No.	135	1.3	V
Coconut	No.	000	9.0	II
Guava	No.	53	0.7	V
Pineapple	No.	460	4.0	V
Grapes	Kg.	600	6.0	V
Other fresh fruits	No.	1000	10.0	V

food item	unit	no. of calories per unit	protein per unit (in gm.0.0)	food group
(1)	(2)	(3)	(4)	(5)
<u>DRY FRUITS & NUTS</u>				
Coconut Copra	Kg.	6620	68.00	II
Ground nut	Kg.	5490	267.00	II
Cashew nut	Kg.	5900	212.00	II
Dates	Kg.	1440	12.00	V
Raisin	Kg.	3050	18.00	V
Other dry fruits & nuts	Kg.	2500	200.00	V
<u>SUGAR</u>				
Sugar	Kg.	3900	1.00	I
Gur (cane)	Kg.	3030	4.00	I
Khandasari	Kg.	3900	-	I
Sugar candy	Kg.	3900	-	I
Sugar (others)	Kg.	3500	10.00	I
<u>SPICES</u>				
Turmeric	Gm.	3.49	0.06	V
Black pepper	Gm.	3.04	0.12	V
Pepper, dry chillies	Gm.	2.46	0.16	V
Green chillies	Gm.	0.29	0.03	V
Garlic	Gm.	1.23	0.05	V
Tamarind	Gm.	1.90	0.02	V
Ginger	Gm.	0.54	0.01	V
Curry powder	Gm.	0.00	0.00	V
Other spices	Gm.	0.60	0.06	V
<u>BEVERAGES, REFRESHMENTS</u>				
Tea	Cups	.27	0.30	V
Coffee	Cups	.40	0.30	V
Biscuits, confectionaries	Kg.	2450	70.00	V
Bread	Kg.	2450	70.00	V
Salted refreshments	No.	600	3.00	V
Prepared sweets	No.	500	6.00	V
Cooked meals	No.	1200	30.00	V
Pickles	Gm.	4.00	0.11	V
Sauce	Gm.	0.60	0.03	V
Jam, Jolly	Gm.	2.50	0.01	V
Processed food (others)	No.	600	20.00	V

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