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Millets in Indian Diets: An Overview

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Millets have long been part of traditional Indian diets. India accounts for nearly half of the global millet production and consumption. Four major millets (sorghum, pearl millet, finger millet, maize) and four minor millets (bamboo seed, buckwheat, oats and amaranthus seed) are grown in rain-fed areas, dry land and hilly tracts in India. Millets are drought-resistant and can be grown alongside legumes like red gram and green gram that improve soil health. Traditionally, millets are consumed unrefined and, therefore, there is no loss of mineral and B-vitamin content. Cereals and millets, in a traditional diet, can provide 50-80% of the daily requirement of energy, minerals, and all vitamins except C, A and D. Millets contain 10% or more of dietary fiber as well as biologically active phytochemicals like antioxidants, lignans, phenolic acids, and phyto-estrogens. The high dietary fibre content and the low glycaemic index of millets are believed to protect against diabetes, cardiovascular diseases, and non-communicable diseases in general.

Time trends in millet production

India leads all other countries of the world as regards production of millets (Table 1). Time trends in production of millets, rice and wheat between1966-71 and 2001-2006 are given in Table 2. In the decades since the Green Revolution (1966-71), cereal production has increased from 120 MT to 280 MT whereas millet production has remained almost unaltered at 18.7 MT. Rice production increased two-fold and wheat production by more than two-fold. Between 1962 and 2006 the population of India has increased three-fold and the requirement of cereals has increased from 44.2 MT to 125.1 MT during this period. During 1956-61 millet production met nearly one-third of the cereal grain requirement with rice/wheat production meeting the other two-thirds (Table 2). The increased requirements of cereals have been met mostly by rice and wheat. Millet production has stagnated. The country's population shifted readily from consuming millets to consuming rice/wheat because the latter have been made available to those below the poverty line at subsidized cost, they are easier to cook, and perhaps more tasty. The emergence of climate change and water scarcity as constraints in recent years has given the agricultural sector a rationale for investing in increasing millet production; the emergence of non-communicable diseases as a public health problem, and the realization that increased millet consumption may have benefits in reducing the incidence of cardiovascular diseases and diabetes have opened a window of opportunity to increase millet production and consumption.

Steps to improve millet production

The current estimated production of millets (the major ones such as sorghum, bajra, ragi and maize) during 2001-2006 is only about 18 MT. To keep the cereal-to-millet ratio of production and consumption unaltered while coping with the increase in total population, the millet production should have increased to 52 MT (Table 3). To increase the production of millets from its current level of 18 MT to 52 MT, there is a need for considerable augmentation of inputs from different agricultural sectors including food processing and marketing; efforts should be made to ensure reasonable profitability in millet cultivation for the farmer, comparable to cereal cultivation. Support should be available to the cultivator on the technology front for increasing productivity. The setting up of cooperatives for production may help cultivators in improving production; facilities for processing, storage and marketing of millets are needed to assist wholesalers and retailers in making millets available to the end-consumers at affordable cost so as to increase the millet consumption habit. Cooperatives should take up the task of purchasing millets from the farmers, and also be responsible for storage, distribution and delivery to the consumer.

Nutrient composition of millets

Early studies at the National Institute of Nutrition (NIN), Hyderabad, provided data on the nutrient composition of millets. Table 4 shows the nutrient content of some major millets (unrefined), and compares them with polished rice and with whole as well as refined wheat flour. As Table 4 shows, millets contain particularly high levels of

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Table 1 Millet consuming countries of the world (5 year average in metric tons)					
Country	**Millet Consumption**	**%**	**Country**	**Millet Consumed**	**%**
INDIA	9,041,766	43.5	SENEGAL	3,47,989	1.7
NIGERIA	4,299,211	20.7	CHAD	296,119	1.4
NIGER	1,733,793	8.3	RUSSIAN FEDERATION	280,941	1.4
CHINA	1,116,505	5.4	ETHIOPIA	259,490	1.2
BURKINA FASO	856,337	4.1	NEPAL	251,027	1.2
MALI	701,701	3.4	MYANMAR	137,759	0.7
SUDAN	560,548	2.7	GHANA	117,955	0.6
UGANDA	408,137	2.0	Others	393,842	1.9
			Total	208,031,20	

Table 2 Production of millets and cereals post Green Revolution (million tons)								
Crop	**1966-71**	**1976-1981**	**1981-1986**	**1986-1991**	**1991-1996**	**1996-2001**	**2001-2006**	**% Change***
All Millets	18.41	17.87	20.70	20.89	20.78	19.69	18.68	101.5
Rice	38.09	42.94	48.86	56.53	67.15	77.33	85.00	223.2
Wheat	18.10	25.17	32.88	43.37	49.92	60.12	70.61	390.1
All Cereals (Rice & Wheat)	56.19	78.11	81.74	99.90	117.6	137.45	145.61	259.1
Ratio of Millet to Cereal Production	0.33	0.23	0.25	0.21	0.18	0.14	0.13	39.4

*expressed as % change as compared to production during 1966-71

Table 3 Comparison of growth in cereal and millet production in India (MT/year)					
Parameters	1960 -61	1970 -71	1980 -81	1990 -91	2000 -01
Population in million	433	539	675	832	1015
Food grains	82	108.4	129.6	176.4	196.8
Pulses	12.7	11.8	10.6	14.3	11
Cereals	69.3	96.6	119	162.1	185.7
Wheat	21.6	38.3	49.7	69.2	86.4
Rice	34.6	42.2	53.6	74.3	85
Rice +wheat	56.2	80.5	103.3	143.5	171.4
Millets	13.1	16.1	15.7	18.6	14.3
Millet / rice + wheat ratio %	23.3	20.0	15.2	13.0	8.3
Millet production needed to keep the ratio as of 1960-61		18.8	24.1	33.4	40.0

Source : **Agricultural Statistics at a Glance 2007:** http://dacnet.nic.in/eands/Area,%20Production%20and%20Yield%20of%20Principal%20Crops.htm

Table 4 Nutrient* composition of millets as compared to wheat and rice									
Cereal/Millet	Protein (g)	Carbohydrate (g)	Dietary Fibre (g)			Minerals (g)			
			Total (g)	IDF (g)	SDF (g)	Total (g)	Iron (mg)	Calcium (mg)	Zinc (mg)
Wheat Flour (refined)	11.0	73.9	0.3			0.6	2.7	23	0.6
Whole	12.1	69.4	12.5	9.6	2.9	2.7	4.9	48	202
Rice, raw milled	6.8	78.2	4.1	3.2	0.9	0.6	0.7	10	1.4
Millets:									
Bajra(Pearl Millet)	11.6	67.5	11.3	9.1	2.2	2.3	8.0	42	3.1
Ragi(Finger Millet)	7.3	72.0	11.5	9.9	1.6	2.7	3.9	344	2.3
Italian Millet (Fox Tail Millet)	12.3	60.9				3.36	2.8	31	2.4
Jowar (Sorghum)	10.4	72.6	9.7	8.0	1.7	1.6	4.1	25	1.6
Maize (dry)	11.1	66.2	11.9	11.0	0.9	1.5	2.3	10	2.8

* Protein, Carbohydrate, Dietary Fibre & Minerals.
IDF – Insoluble Dietary Fibre; SDF- Soluble dietary Fibre

dietary fibre, both soluble and insoluble, to the extent of 10% or more. Whereas fibre is lost in milling and polishing of cereals, it is intact in millets because they are consumed in unrefined condition. Millets also contain valuable vitamins. Pearl millet (ragi) is particularly rich in calcium, 300mg per 100g. This is 10 to 30 times the amount available in rice. The daily calcium requirement can be met by consuming about 200g of *ragi*. Some of the millets are also rich in omega (**ω)**-3 fatty acids (Table-5) which help in increasing the HDL cholesterol levels in blood, thereby reducing the risk of cardiovascular diseases.

Potential role of millets in prevention of non-communicable diseases

The role of dietary fibre

Dietary fibre can slow the absorption of carbohydrates and thereby have a protective effect against non-communicable diseases such as diabetes. Millets are a rich source of dietary fibre (Tables 4, 6). The consumption of whole grains and millets increases the intake of dietary fibre. There are very few studies documenting the relative effectiveness of different millets as compared to whole-grain cereals and the minimal daily intake of different millets needed for protecting against non-communicable diseases. However, epidemiological studies have shown that dietary fibre, especially soluble fibre, lowers the risk of cardiovascular diseases[1,2]. Numerous research studies have shown that intake of whole grains with high fibre content lowers serum cholesterol, inhibits lipid peroxidation, increases insulin sensitivity and improves homocysteine levels[3-7]. However, these results have not been replicated in some other studies[8]. It is possible that these effects may be stronger with intake of millets with higher total fibre content.

There have been a number of case-control and population-based studies in Europe, the US and Canada, reporting that consumption of whole grains containing high levels of dietary fibre, minerals, and some vitamins may protect against or reduce the incidence of diseases like diabetes mellitus, certain types of cancers, and coronary heart diseases, as compared to diets that contain refined flour[9-26] The protective effect of whole-grain cereal consumption has been demonstrated in large-scale studies in patients with diabetes mellitus, hypercholesterolemia, and cardiovascular diseases[23-27]. The observed biological effect of whole-grain cereal is attributable to the higher dietary fibre content, similar to the effects observed with high-fibre fruits and vegetables. Some of the metabolic observations are also attributed to the presence of bioactive phytochemicals in the unrefined cereal grains, millets, and some fruits and vegetables[18].

The protective effect of whole grains has been reported in colorectal cancer among women[9], pancreatic cancer in the general population[10], post-menopausal breast cancer, and oral, esophageal, and laryngeal cancers[12]. Although very low intakes of plant foods were shown to increase the risk of these diseases[18-21], studies do not confirm lower risk of colon cancer with higher intake of plant foods[17]. In the US and European countries, cereals like wheat and rice are usually consumed in the refined form, containing very low dietary fibre. The Framingham Offspring Cohort studies have shown that whole-grain intake is inversely related to insulin resistance, lower prevalence of metabolic syndrome and type-II diabetes[26]. Data from the Nurses' Health Study in women with diabetes indicated that whole grains with low glycemic index diet may reduce systemic inflammation[22]. Observational studies have found that diets rich in whole-grain foods are associated with improved insulin sensitivity[22]. A prospective study of whole grain as a substitute for refined grain in the diet indicated that the risk of diabetic mellitus was lower in those consuming whole grains[23]. In another study, the consumption of a variety of whole-grain foods and legumes besides

Table 5 Fat and α and ω fatty acid content of cereal and millets (g/100g)					
Cereal/Millet	Fat	Unsaturated fatty acids			
Cereals		α Linolenic acid	ω Linolenic acid	Total Polyunsaturated	Ratio %
Rice	1.7	0.5	0.01	0.51	1.96
Wheat	2.9	1.1	0.17	1.27	13.39
Millets					
Maize	4.8	2.2	0.05	2.25	2.22
Jowar	3.3	1.5	0.05	1.55	3.23
Ragi	1.5	0.3	0.05	0.35	14.29
Bajra	5.5	2.2	0.13	2.33	5.57
Fenugreek Seeds	10.0	3.4	1.9	5.3	35.85

Table 6 Fibre and micronutrient content of millets						
Millets Grown in India	**Fibre (g)**	**Minerals (g)**	**Iron (mg)**	**Calcium (mg)**	**Vit. B_1 Thiamine (mg)**	**Vit. B_2 Riboflavin (mg)**
Major Millets						
Bajra	11.3	2.3	8.0	42	0.33	0.25
Jowar	9.7	1.6	4.1	25	0.37	0.13
Ragi	11.5	2.7	3.9	344	0.42	0.19
Maize	11.9	1.5	2.3	10	0.42	0.10
Italian millet	10.1	3.3	2.8	31	0.59	0.11
Pani Varagu (French millet)	2.2	1.9	0.8	14	0.20	0.18
Minor Millets						
Saamai	7.6	1.5	9.3	17	0.30	0.09
Sanwa millet	9.8	4.4	5.0	20	0.33	0.10
Varagu	9.0	2.6	0.5	27	0.33	0.09
Seeds *Rajkeera*	2.7	3.5	17.6	223	-	-
Amaranth Seeds	9.6	3.1	11.0	510	-	-

Table 7 Phytochemicals in millets grown in India			
S.No.	**Millets**	**Common Name**	**Phytochemical Compounds**
01.	Pearl millet	Bajra	Polyphenol
02.	Finger millet	Ragi	Lignans
03.	Fox Tail millet	Korra	Phytosterols
04.	Kodo millet	Varagu	Dietary Fibre
05.	Barnyard millet	Jungle Rice	Phytoestogens
06.	Little millet	Samai	alpha tocophenols
07.	Taffe millet		Saponin
08.	Fonio millet	Raishan	Pigmements
09.	Sorghum	Jowar	Phyto cyanins
10.	Corn	Maize	Carotenoids
12.	Sanwa millet	Samai	Better vitamins and minerals
13.	Amaranth seeds	Raj keera seeds	Minerals
14.	Buck Wheat	Kootu	Dietary Fibre
15.	Oats	Oats	Dietary Fibre

Table 8 Effect of pearling on the chemical composition of millet (Sorghum)			
Component	**Unpearled sorghum**	**Pearled sorghum**	**% Change on pearling**
Ash (g%)	2.12	1.42	- 34.7
Phosphorous (mg/100g)	342	225	- 36.7
Magnesium (mg/100g)	171	108	- 35.6
Calcium (mg/100g)	15.3	9.2	- 35.0
Iron (mg/100g)	4.24	3.69	- 12.97
Ionizable Iron (mg/100g)	0.84	0.98	+28.7
Zinc (mg/g)	25.0	11.4	- 54.2
Copper (mg/g)	4.44	2.67	- 40.1
Manganese (mg/g)	11.5	8.7	- 24.3
Molybdenum (mg/g)	0.652	0.406	- 29.2
Chromium (mg/g)	0.167	0.125	- 25.5

vegetables and fruits was found to be beneficial in the prevention of type-II diabetes[24]. Long-term dietary intervention studies have provided confirmation that dietary modification involving increased consumption of fibre-rich whole-grain products and vegetables can reduce the risk of progression from IGT to type-II DM, thereby producing sustained benefit in individuals with diabetes.

Lipid extracts from sorghum, when fed to hamsters, were reported to reduce plasma non-HDL cholesterol concentration[28]. Diabetic rats that were fed on amaranth grains for 3 weeks showed considerable improvement in lipid profiles[29]. Phytochemical antioxidants are known to protect against systemic inflammation and thereby offer protection against several non-communicable diseases. Millets are rich in phytochemical nutrients. The details are shown in Table 7.

There is a need for more studies on the protective effects of Indian millets against non-communicable diseases. There have been relatively few epidemiological or clinical studies exploring the protective effects of millets, whole grains, and vegetables on diabetes, cardiovascular diseases and cancers in India. Unlike the earlier era when the rural and tribal poor depended mostly on millets to meet the major portion of their grain intake, currently, both in urban and rural populations, there are very few households that depend mostly on millets as the major food grain in their diets. The urban and rural poor as well as the middle-income group consume mainly polished rice and refined forms of wheat flour. It is important to explore the protective effects of diets wherein millets are consumed alongside rice, wheat and vegetables as is practical under the existing conditions in India. Systematic research should be taken up on current millet consumption levels in different parts of the country and the impact of increasing the consumption of millets as compared to the impact of increasing the consumption of whole grains like wheat and red rice, legumes and vegetables in conferring protection against non-communicable diseases like diabetes mellitus, cardiovascular diseases and cancers. Such studies should take into account both the quantity and the quality (extent of refinement) of the millets, because both these are likely to be major factors that modify the protective effect.

Table 9 Effect of malting on composition of pearl millet and *ragi*						
Component	**Pearl millet**		***Ragi***		**Percent Change on malting***	
	Whole grain	**Malted grain**	**Whole grain**	**Malted grain**	**Pearl Millet**	**Ragi**
Ash (g%)	1.8	1.4	2.4	1.9	77.8	79.2
Phosphorous (mg per 100g)	379	285	320	264	75.2	82.5
Magnesium (mg per 100g)	137	110	137	115	80.3	81.4
Calcium (mg per 100g)	46	41	398	207	89.1	52.0
Iron (mg per 100g)	8.0	3.7	3.9	3.4	46.3	87.2
Zinc (mg per 100g)	31.4	26.4	23.3	16.5	86.1	70.8
Manganese (mg per 100g)	11.5	7.0	54.9	46.0	60.9	83.8
Copper (mg per 100g)	10.6	6.7			62.0	---
Molybdenum (mg per 100g)	0.69	-	1.02		---	---
Chromium (mg per 100g)	0.23	0.20	0.28	0.26	87.0	92.9
Ionizable Iron at pH 7.5 (mg per 100g)	0.64	2.7	0.29	7.98	421.9	1027.6
Percent of Total Iron	9.0	73.5	7.4	88.3	804.0	1193.2
Soluble Zn at pH 7.5 (mg per 100g)	0.653	5.25	2.15	3.24	332.5	150.7
Percent of Total Iron	2.04	19.8	3.24	19.7	970.6	608.0
Phytin Phosphorous (mg per 100g)	172	6.9	132	88.0	40.1	66.7
Percent of total P	45.5	24.4	41.2	33.3	53.6	80.8
***malted / whole grain X 100**						

Steps to improve the acceptability of millets

Millet grains are coarse in appearance and may not be acceptable to many, especially in contrast with the appearance of other food grains. Polishing the millets to improve their external appearance is one way to improve their acceptability. The Central Food Technological Research Institute (CFTRI), Mysore, has developed a technology involving the removal of the outer skin of the millet grains. Millets processed thus are termed as “pearled millets”. This technology can be applied to ragi, sorgum and bajra. White ragi can be produced from black or brown ragi. Genetically modified white ragi has also been developed. The pearled grains have a higher mineral content than the raw grains, though their fibre content is marginally reduced. Although the chemical composition of white ragi is not much different from that of brown ragi, its potential for protecting against non-communicable diseases has yet to be tested. If the pearled grains of ragi, jowar and bajra are also shown to be as biologically effective and more acceptable than the original grain, the processed grains can be industrially produced and marketed to all sections of the population.

The impact of pearling on the chemical and nutritional quality of various millets has been studied by scientists at the NIN. Data are available relating to the effect of pearling on the chemical composition of sorghum (Table 8), the effect of malting on pearled millet and ragi (Table 9), the effect of malting on brown and white ragi (Table 10), and the effect of malting on the protein quality of white and coloured ragi (Table 11). The amino acid compositions of white and brown ragi are given in Table 12. The analyses of these

Table 10 Effect of malting on composition of brown and white *ragi*				
Chemical component	**Brown r*agi***		**White *ragi***	
	Before malting	**After malting**	**Before malting**	**After malting**
Protein (g%)	8.7	8.2	12.3	11.3
Tannin (mg/100g)	2392	1102	Nil	Nil
Total Phosphorous (mg/100g)	202	193	197	174
Phytin Phosphorous (mg/100g)	149	63	150	52
Total Iron (mg/100g)	4.4	1.8	12.0	2.0
Ionizable Iron (mg/100g)	425	1578	1174	1825
Total Zinc (mg/100g)	2.1	2.0	2.4	2.0
Soluble Zinc (mg/100g)	903	1635	1407	1752
Ash (g/100g)	1.8	1.8	1.7	1.7

Table 11 Effect of malting on the protein quality of coloured and white ragi compared to casein (PER + NPU)					
Protein quality parameter	**Casein**	**Coloured ragi**		**White ragi**	
		Raw	**Malted**	**Raw**	**Malted**
Protein Content of the diet (g%)	6.4	6.6	6.6	6.6	6.6
Food Intake (g/28 days)	349	229	245	232	262
Gain in Body Weight (g/28 days)	98	18	20	22	31
PER	3.98	1.18	1.24	1.40	1.80
Adjusted PER	2.5	0.7	0.8	0.9	1.1
Digestibility %	96	87	85	91	88
Protein digestibility %	83	60	58	76	70
NPU	79	31	30	35	36

Source: Food Chemistry 51 (1994), 433-436 PER: Protein Efficiency Ratio; NPU: Net Protein Utilization

Table 12 Amino acid composition of brown and white *ragi*		
Amino acid (essential)	**Brown *ragi* (WR -9)**	**White r*agi* (Indab-5)**
Argine	2.19	2.49
Histidine	1.70	1.72
Lysine	1.49	1.62
Tryptophan	1.6*	-
Phenyl Alanine	3.22	3.15
Tyrosine	2.60	2.30
Methionine	2.49	2.64
Cystine	2.24*	-
Threonine	2.72	3.73
Leucine	5.28	5.28
Isoleucine	1.36	1.45
Valine	2.50	2.32

Table 13 Potential food preparations out of millets		
Millets	**Food Preparations**	
	Household foods	**Commercial preparations**
Ragi	Mudde/Dumpling	Vermicelli
Sajje	*Ragi, Roti, Sajje Roti*	Biscuits
Jola	Maize *Roti*	Drinks
Maize	*Dosa* with *Chutney*	*Idlis*
Jowar	*Idli with porridge*	Blanched product Flattened
Foxtail – Korralu	Puffed Millets (ragi, maize, jola)	Puffed millets (Maize, ragi)

data demonstrate that malting produces significant changes in the fibre and mineral content but only a marginal decrease in vitamins. Malting of ragi and other millets, while resulting in a loss of fibre and inorganic components, leads to an improvement in their acceptability and in the availability of iron. This is because of the increase in ionizable iron and soluble iron with a decrease in phytin phosphorus.

Some popular recipes with millets

Millets have been traditionally used in regional cuisines, and several of the recipes are still popular among the older generation in both urban and rural areas. Millets can be promoted as a substitute for rice or wheat in several recipes. Some widely used ragi preparations in the South Indian cuisine are given below and also shown in Table 13:

Malt: Prepared out of ragi or any other millet, it can be used as a complementary food for infants between 6-11 months of age. Because of the high calcium content, ragi can be widely used to improve calcium intake in diets of pregnant women and/or the elderly.

Ragi balls: Ragi flour is cooked in the form of balls; these are eaten with sambar or chutney.

Roti: Ragi flour or any other millet flour can be used instead of *atta* or *maida* for making rotis.

Dosa: The traditional *dosa* is made of ground and fermented rice and *urad dal*. Instead of rice, one can use ragi or any other millet.

Idli: The traditional *idli* is also made of ground and fermented rice and *urad dal*. Here again, instead of rice, ragi or any other millet can be used.

Vermicelli: This can be made with millets as a substitute for wheat or rice.

Puffed rice: Puffed rice, puffed ragi, maize, and jowar are traditionally used as snacks.

Similarly, there are cereal (rice and wheat) preparations from the North, West and East of the country in which millets can be used instead of rice or wheat.

Summary and conclusions

- Millets are one of the major cereal groups grown and consumed in India.
- They are a traditional food with valuable

nutrient content, but their production and consumption have been stagnant over several decades.

•The ready availability of rice and wheat through the public distribution system at subsidized cost to the poor has resulted in urban and rural populations shifting from millet consumption to consumption of rice and wheat.

•Millets are considered to be favourable crops for dry land agriculture.

•Millets are a rich source of dietary fibre, minerals and biopharmaceuticals such as phytochemicals.

•Millets are likely to offer protection against non-communicable diseases such as diabetes, cardiovascular diseases and cancer.

•Millets can be pearled and malted to improve their appearance, taste and acceptability although some dietary fibre and minerals are lost in the process.

•In many traditional recipes of all regions of India, millets can be used in the place of rice or wheat.

Although large-scale population-based studies in the US, Europe and Canada have shown the protective effects of whole-grain diets on cardiovascular diseases, there are very few studies of the specific impact of millets as a protection against these diseases. It is very important to conduct such studies with millets in India. If it is established that a diet rich in millets can protect against diseases such as diabetes and cardiovascular diseases, it would have widespread implications for agricultural and health policies. The Indian population can be persuaded through health and nutrition education to shift partially from rice and wheat to millets in their daily diets.

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Reviews and comments

Mother Child Protection Card

Prema Ramachandran

A Mother Child Protection Card (MCPC) has been developed jointly by the Ministry of Women and Child Development and the Ministry of Health and Family Welfare of the Government of India. It is perhaps the most visible evidence of convergence between the ICDS and health services. It is envisaged that MCPCs (placed within a clear plastic cover for protection) will be given to pregnant women and mothers of children under the age of three years, to be retained by the mothers. The card is in the form of a folded brochure, with one fold devoted to each of the following: the identification particulars of the family, the findings during antenatal care, delivery, and post-natal care, immunisation records, and growth data of children under 3 years of age. In addition, there are pictorial depictions of authentic nutrition and health education messages regarding danger signals during pregnancy and labour, appropriate infant and young child feeding practices, and the normal development pattern of under-3 children. It is expected that this card will serve as a combined record of the services provided by the ICDS and by the health services, and will also function as a tool to trigger health referrals as required. With rising literacy levels in most States, family members will have an opportunity to know the current health and nutritional status of the mothers and children and benefit from the health and nutrition messages contained in the card. It is expected that State-specific cards in local languages will be made available shortly. It is also expected that near-universal use of the MCPC, coupled with improved monitoring through the mother-child tracking system of the Ministry of Health and Family Welfare and the revised MPR of the Ministry of Women and Child Development will improve the coverage, content and quality of health and nutrition care provided to pregnant women and young children.

Training of ANM/AWW to measure and record weights accurately in the MCPCs

The institutionalisation of the Village Health and Nutrition Day now enables optimal convergence of health and nutrition services to mothers and their children at anganwadis on a specified date and time. Weight is an essential parameter for assessment of the nutritional status of children. Efforts are under way to ensure that accurate weighing balances are supplied to all anganwadi centres. The ANMs/AWWs are being trained in the appropriate methods of checking the accuracy of balances, measuring children's weights, and recording them properly in the MCPCs. They are also being trained to record details of health examination findings of the mothers and children, and the health care services they have received, if any. These details are to be recorded in the appropriate places in the MCPC so that the record is available with the mother at all times, wherever she goes for health care.

Use of MCPCs for assessment of health and nutritional status of mothers and children

The incorporation of the WHO 2006 charts for growth monitoring in children under the age of 3 years is a major step towards operationalisation of growth monitoring aimed at early detection and effective management of undernutrition. The National Institute of Public Cooperation and Child Development has completed the training of master trainers for operationalisation of the MCPC and growth monitoring using the WHO 2006 standards. The manuals required for such training have been developed and distributed. However, operationlisation of the MCPC would require training of the entire chain of human resources in both the Ministries at all levels,- starting with the ANMs and AWWs and going right up to the State-level officials. This truly gigantic task has to be completed within a short period of time if the cards are to be operationalised before the end of 2012 – the first year of the Twelfth Five Year Plan.

Use of MCPCs and monthly progress reports on the basis of WHO MGRS standards

The Ministry of Women and Child Development has revised the format of its monthly progress report; henceforth, the reporting of undernutrition will be according to the WHO 2006 standards. A recent review by the Ministry indicates that, in many States, the use of the MCPC for recording data on nutritional status is not optimal, and efforts to reinforce the nutrition and health education messages are very patchy. Very few anganwadis are currently plotting weight details in the growth charts and using the data for identification of growth faltering and detection of undernutrition so as to initiate appropriate interventions. As most of the anganwadi workers are still using IAP standards to report the prevalence of undernutrition, the MPRs in many of the States are still in the old format. Efforts are under way to overcome the this as early as possible.

Overall, the MCPC is expected to, improve the efficiency and synergy between the nutrition and health care services, inform and motivate the care givers, improve data collection and increase the awareness of the population at large. Above all, it will ensure more timely intervention in the vulnerable sections of the population such as pregnant women and children under the age of three years.

The author is Director- Nutrition Foundation of India.

FOUNDATION NEWS

- **Study Circle Lectures**

"Infant Mortality in India" by Dr Prema Ramachandran (Director, Nutrition Foundation of India) on 30th April 2012.

"Japanese Dietary Patterns: some observations" by Dr Alka Mohan Chutani (Chief Dietician, AIIMS, New Delhi) on 23rd May 2012.

"Factors influencing nutritional status in preschool children" by Ms Shavika Gupta (Research Scholar, Nutrition Foundation of India) on 25th June 2012.

- **Summer Internship:** During June 2012, 20 MSc students have come to NFI as summer interns. Their training programme has two components;, theory classes and community based surveys. Theory classes dealt with RDA, emerging problem of dual nutrition burden, anaemia and its adverse consequences, ongoing nutrition intervention programmes to combat nutritional problems, nutritional epidemiology, research methodology to be used in planning nutrition surveys, principles in evolving study design for surveys and calculation of sample size for surveys.

They have been taught how to test accuracy and sensitivity of electronic balances, accuracy of other instruments used for assessment of nutritional status, trained in taking height , weight, circumferential measurements and estimating Hb accurately and use of quality control measures to ensure accuracy under survey conditions. They will be completing a small community based study on assessment of nutritional status in urban low income group, undertake data entry, analysis and report writing before they complete their internship. This training will help them to plan and complete their MSc dissertation.

NUTRITION NEWS

The 44th National Conference of Nutrition Society of India will be organised by the NSI Tirupati Chapter at Tirupati between 15th to 17th November 2012 with a Pre-Conference Workshop on 15th November 2012.

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