Respected Chairpersons and dear friends, I wish you all very good evening. At the outset, I request you to bear with me for I am going to talk on nutrition monitoring while the session is on nutritional surveillance. As Dr. Mittal has rightly pointed out, the nutritional surveillance system in our country is in the offing and is still at the stage of infancy. Nevertheless, the system of nutritional monitoring is fairly well established, at least in the States where National Nutrition Monitoring Bureau (NNMB) is in operation.

Nutrition monitoring helps to assess nutritional problems prevalent in the community, in terms of their nature, magnitude and distribution among the population groups as well as geographical areas. Such monitoring over a period of time gives us an opportunity to study the changes occurring over a period of time. This information is necessary to evolve policies, to formulate appropriate programmes and implement the same for the prevention and effective control of nutritional deficiency disorders. It highlights the need to evaluate the ongoing nutrition programmes, identification of bottlenecks if any and to initiate corrective steps, wherever necessary.

In the course of my presentation today, I will briefly talk about the genesis of NNMB, its structure and mode of its functioning. Then I will present the salient observations made in the latest diet and nutrition assessment surveys carried out during 2001-2002, followed by the time trends in food and nutrient intake and nutrition status of the individuals over the last 3 decades. Lastly, I will present the results of special survey viz., micronutrient deficiency survey carried out in 8 States, during 2003.

Prior to 1972, the State nutrition bureaus were collecting data on nutritional status of communities in their respective States. However, most of them were sporadic and were often based on different survey methodologies, and inadequate sample size, rendering such data non-comparable between the States. Therefore, in the year 1972, the NNMB units were established in 10 States viz., Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, Maharashtra, Madhya Pradesh, Orissa, Uttar Pradesh, Gujarat, and West Bengal, under the aegis of National Institute of Nutrition, Indian Council of Medical research. Since its inception, have been collecting information on diet & nutritional status of communities on a regular basis, with the main objective to develop a reliable database on nutritional status of communities, based on systematic surveys carried out by adopting statistically valid sampling designs and sample sizes, and by using standard methodologies uniformly in all the States.

The specific objectives of the NNMB are to carry out diet surveys to assess the food and nutrient intakes at household and individual level, and to carry out
anthropometry and clinical examination of individuals to assess their nutritional status, on a continuous basis, on representative segments of the rural/urban/tribal population in the States, by adopting standard procedures and techniques; to evaluate ongoing national nutrition programmes to identify their strengths and lacunae and to recommend appropriate corrective measures. The Central Reference Laboratory (CRL) of NNMB located at the National Institute of Nutrition is responsible for coordinating the activities of the State Units, designing the studies, preparing, pre-testing and finalizing the survey instruments, training and standardization of the investigators, quality control of data collection, compilation, processing and analysis and preparation of final reports. While the Indian Council of Medical Research (ICMR) provides the necessary financial inputs, the steering committee constituted by ICMR with experts in the field of nutrition provides the technical advice regarding NNMB operations.

Each of the NNMB unit has a team of five members consisting of one medical graduate, a nutritionist, a social worker or an anthropologist, field attendant, and a driver with a vehicle. The investigations carried out by NNMB during routine diet and nutrition assessment surveys include, collection of household demographic and socioeconomic particulars, dietary intakes of households as well as individuals, anthropometric measurements of individuals like high, height/recumbent length, weight, mid-upper arm circumference and skin fold at triceps and examination for presence of clinical signs of nutrition deficiencies. In addition, secondary information at the village level such as population, agricultural production, nutritional and other developmental programmes that are in operation are also collected. Prior to 1983 the sampling was done based on stratification of districts in a State according to developmental categories and every year four districts of different developmental categories were covered, at the rate of one district per quarter. In each of the selected district, the villages were selected by stratified random sampling procedure, by adopting probability proportion to size of the village. Subsequently, from mid nineties, the NNMB has been adopting sampling frame of Consumer Expenditure Survey, carried out every five years by the National Sample Survey Organization, for selection of a sub-sample of villages. In each of the villages, households are selected by cluster sampling procedure. For this purpose, the village is divided in to 5 geographical areas, of which one formed the SC/ST households. In each of the geographical areas, a cluster of four consecutive households is covered, by selecting a random start. In all the twenty households thus selected, all individuals are covered for anthropometry and clinical examination. In a sub-sample of 10 households, 24 hour recall method of diet surveys are carried out to assess the food and nutrient intake of the individuals.

Highlights of the of the NNMB surveys carried out so far include coverage of rural, tribal and urban communities for the assessment of diet and nutritional status, repeat surveys carried out in the rural areas at three points of time viz., 1975-79,
1988-90 and 1996-97 covering the same villages that were covered initially, so that the data at 3 different time points was made available to study the time trends. Similar repeat surveys were carried out in the tribal communities during 1985-87 and 1998-1999. Some of the special surveys that were carried out by NNMB include diet and nutrition assessment of adolescent groups and the elderly, assessment of micronutrient deficiency disorders such as iron deficiency anaemia, vitamin A deficiency, and iodine deficiency disorders by covering statistically adequate samples, and evaluation of National Nutritional Programmes.

Following are the salient observations, made in the recent survey carried out by NNMB during 2001-02. The data pooled for the States, revealed that about 11% of the households covered belonged to Scheduled castes (SC), 22% belonged to Scheduled Tribes (ST), while 32% belonged to backward communities (BC). A bout a third (30%) of the households were residing in the “Kutcha” houses, while about 10% were residing in the “Pucca” houses. In about of the HHs. The major occupation in about 40% of the households was agriculture labour (18%) or other labour (22%). Only about 55% were cultivators having varying extent of agricultural land, of whom, a majority were marginal farmers having less than 2.5 acres. The average per capita income was less than 300 Rs. per month in about 43% of the households, while only 12% had more than Rs.900 per month. The adult female literacy rate was 47%, with about 30% having studied up to 1st to 8th standard. The major source of drinking water was taps in about 40% of the HHs, while about 26% were dependent on bore wells and about 32% on open wells.

The diet survey revealed that among 1-6 year children, except for roots and tubers, the consumption of various food like cereals and pulses was less than RDA. The intake of protective foods like green leaf vegetables, milk & milk products, income elastic foods like fats and oils and meat/fish/eggs was very low, often less than 20%-30% of recommended Dietary Intakes (RDI) levels. The intake among the adults was relatively better where the requirement of cereals were met but that of pulses were still inadequate both in males and females. The median intakes of all the nutrients were below the recommended levels among both in 1-3 year, and 4-6 year children, while the intake of micronutrients like vitamin A, riboflavin and iron was grossly inadequate. In case of adults, the intakes were relatively better with respect to protein, energy, calcium, thiamine and niacin, while that of other micronutrients was poor. Distribution of individuals according to protein-calorie adequacy status of individuals, revealed that while only 30% of children were having protein-calorie adequacy, their proportion among adults was about 80-90%. It may be mentioned here that there was no ‘gender bias’ with regard to food intake, in any of the age groups.

Distribution of preschool children according to weight by age using NCHS reference values, by Gomez classification revealed that only about 9% were normal, 6% were suffering from severe undernutrition, while a majority (75%) had mild to
moderate undernutrition. Nutritional grading of children according to Standard Deviation (SD) classification revealed that nearly 62% of both boys and girls of 1-5 years were having underweight (weight for age < median-2 SD of NCHS). Similarly, about 50% of boys and girls had various degrees of stunting, while about 23% were having wasting. No gender differentials were observed in the prevalence of undernutrition. Distribution of adults according to body mass index (BMI), showed that the prevalence of chronic energy deficiency (BMI less than 18.5) was about 37% in case of males, and 39% in case of females. The extent of overweight/obesity was about of 6-8%, with marginally higher prevalence among females.

The prevalence of undernutrition was relatively higher among low socioeconomic category of households such as those belonging to SC and ST communities, those residing in ‘Kutcha’ houses, those from lower income groups, and in households where in the adult female was illiterate. Study of intra-family distribution of dietary energy revealed that the proportion of households where in the adult male and female were meeting the energy requirements, with the children not meeting the same was maximum in case of pre-school children (43%), which tended to decrease with in crease in the age group of children to 27% in school age children and 13% in adolescents, indicating that the preschool child is at the most disadvantageous position. What is disturbing is, that the proportion of such HHs wherein adults meet the dietary energy but the preschool child is not meeting the same is increasing over the past three decades, from about 25% during 1975-79 to 43% in 1997. This indicates that though there is improvement in the intake of dietary energy among adults, it is not reflected among young children. This reflects lack of knowledge among the women about proper child feeding practices and highlights the need for intensified nutrition education. Comparison of data food and nutrient intakes over a period of three decades revealed that the intakes remained more or less similar, with no significant quantitative and qualitative changes.

The distance charts of heights and weights over a period of 3 decades, showed an increase of 2-3 cm in height and 2-3 kg in weight among both males and females of different age groups. A significant decrease in the extent of severe undernutrition was observed among preschool children, from about 15% in 1975-79 to about 6% in 1997. There was marginal increase in the proportion of 'normals', from 6% to 9% while the prevalence of moderate undernutrition remained same. Similarly, the prevalence of stunting has come down from 64% in 1991 to 49% currently. Over the period, the proportion of adults with normal BMI increased from 42% to 50%, with concomitant decline in the prevalence of CED, from 55 to 45%. The prevalence of overweight, though of low magnitude, tended to double, from 2.3 to 4.1%.

The prevalence of florid forms of protein energy age malnutrition (PEM) like marasmus among preschool children decreased from 1.3% to 0.1% over the period, while that of kwashiorkor was conspicuously absent. The prevalence of clinical forms
of other nutrient deficiencies such as angular stomatitis indicative of B-complex vitamin deficiencies decreased from 6% to 2%. Though the overall prevalence of Bitot spots decreased from about 2% to about 0.7%, it remained more than 0.5% in all the States barring Kerala and Orissa, a cut-off level suggested by WHO, to indicate public health significance of the problem. The prevalence was observed to be relatively more among those children belonging to SC/ST communities, those belonging to households engaged in labour activities, and families where the adult woman is illiterate.

The Micronutrient Deficiencies survey carried out in eight States during 2003 revealed that the overall prevalence of anemia, as assessed by estimation of hemoglobin from finger prick blood samples by cyanmethemoglobin method, ranged from about 70% to 80% in various age, sex and physiological groups. The prevalence of moderate to severe anemia was observed to be maximum in pregnant women of more than 6 months gestation (49%) followed by pre-school children (44%), lactating women (34%) and adolescent girls (22%). The proportion of households consuming salt having adequate amount of iodine ($\geq 15$ ppm) ranged from about 50%-54% in the states of West Bengal and Kerala to about 30% in the states of Andhra Pradesh, Maharashtra, and Tamil Nadu and 25% in Karnataka, Orissa, with least being in Madhya Pradesh (10%).

Thus, the data collected by NNMB over a period of time has shown that in spite of phenomenal increase in food production through ‘green’, ‘white’ and ‘yellow’ revolutions, the problem of undernutrition in India continues to be a public health problem. Though severe forms of undernutrition is decreasing considerably, significantly higher proportion of populations suffer from mild to moderate forms of undernutrition. The increase in population size, low literacy level, recurrent drought conditions, increasing unemployment, decreasing household food security status could be contributing to the dilution of the effects of development trickling down to the grass root level. Therefore, there is need to strengthen the existing nutritional and other developmental programmes such as supplementary feeding, micronutrient supplementation, rural employment generation, public distribution system etc. There is need to improve health and nutrition education activities in the communities, through various media. Health and nutrition education has to be included in the educational curriculum. There is need to establish National Nutrition Surveillance system through existing ICDS infrastructure at various levels, right from household to district or State level, to assess the nutritional problems, analyze the underlying causes and initiate appropriate actions to mitigate the same.

Finally, I thank the organizers for providing me an opportunity to participate in this wonderful annual conference of IAPSM and share my experiences on National nutrition Monitoring Bureau.