INTRODUCTION

In the seventies of the last century, poverty and household food insecurity were experienced by over 70% of the population. Over 70% of the pre-school children and the majority of women were undernourished [1]. National programmes such as food-for-work programmes and the provision of subsidised food to the poorer household through the Pubic Distribution System were initiated to improve household food security [2]. To address the gap between requirement and actual dietary intake in vulnerable groups such as children, pregnant and lactating women food supplementation programmes such as the Midday Meal Programme [3] and Integrated Child Development Services [4] were initiated. As a result of these initiatives, there had been a slow but steady improvement in the household food security and nutritional status of women and children [5]. In the nineties of the last century data from the National Nutrition Monitoring Bureau [6] showed that even in households where dietary intake of energy was adequate in adults (men and women) energy intake was inadequate in about 40% of the preschool children. This was attributed to the poor infant and young child feeding and caring practices. Recent NNMB reports [7] suggest that the trend is worsening and currently in nearly 60% of households where energy intake is adequate in adults, intake of preschool children was inadequate. Data from National Family Health Surveys 1,2,3and 4 [8,9,10,11] District Level Household Survey 2 and 4 [12,13], Rapid Survey of Children [14] CAB component of Annual Health Survey [15] showed under-nutrition rates in preschool children continue to be high; both under and over-nutrition are public health problems in women. Data from NFHS-3 [10] has shown that even in households where women were normally nourished or over-nourished, there were under-nourished preschool children, confirming persistent intra-family differences in the nutritional status between pre-school children and their mothers. Over-nutrition is emerging as a major problem in urban areas even among women in low-income families where under-nutrition in preschool children continues to be high. It is important to assess the magnitude of the differences in nutritional status between mothers and their preschool children and ascertain the factors responsible for the differences in nutritional status between mothers and their preschool children.

When poverty and food insecurity were the major problems, most of the interventions aimed to identify families below the poverty line and provide them with goods

(subsidized food grains free food supplements) to improve energy intake and services to treat infections. With the emergence of a dual nutrition burden among the poor, if the intra-family differences in nutritional status are high, it becomes essential to change the strategy for improving nutritional status to screening individuals and providing personalized counselling for management of under and over nutrition.

Objectives

The primary objective of the study was to assess the intrafamily differences between under five children and other members of the family and also ascertain the factors responsible for these differences.

The secondary objectives were to assess

- dietary diversity , household food security, and physical activity in a sub sample of families
- the intra-family differences in nutritional status between mother and other members of the family

REVIEW OF LITERATURE

This chapter will focus on the available literature under the following heads:

- **Evolution of Concept of Food security**
- **Programme to improve Food security**
- **Current scenario of Food Security**
- **Changes in Dietary and Nutrient Intake**
- **Intra-family Differences in Dietary Intake and Nutritional Status**
- **Changes in Life Style and Physical Activity**
- **Current Nutritional Status of the Indian Population**
- **Nutritional Status of Pre-school children**
- **Changes in Relationship between Stunting and Wasting**
- **Nutritional Status of Children and Adolescents**
- **Nutritional Status of Adults**
- **Intrafamily differences in nutritional status between under five children and other members**

METHODOLOGY

Locale of the study

The study was conducted in the anganwadis of Neb Sarai, Lado Sarai and Anderia Mod in South Delhi from 2015 to 2019.

Permission to conduct the study

Nutrition Foundation of India had taken permission from the Department of Women and Child Development, NCT, Delhi to conduct the study in the urban low-income groups in three areas of New Delhi, namely Neb sarai, Lado sarai and Andheria mod.

Obtain ethical approval

The study was approved by the Ethical Institutional Committee of the Nutrition Foundation of India (NFI), New Delhi.

Study Design

This was designed as a cross-sectional observational study. A complete door-to-door census had been carried out in 30 anganwadis of 3 areas in South Delhi namely Neb sarai, Lado sarai and Andheria modh. Families with under-five children who were likely to stay in the locality for at least one year were identified. The details about the study were explained to these households and the Hindi version of the study information sheet was provided. Week later households were revisited; those who were willing to participate in the study were given the consent form and their consent was obtained. Socio-demographic details of the families were obtained. All under five children, their mothers and other members of these families were enrolled. The majority of the preschool children and their mothers and other women were at home and anthropometric assessment could be carried out during the first or second home visit majority of the children. The 5-18 years age were not at home during the usual home visit; every effort was made to obtain anthropometric measurements in such children by repeated home visits at such times when they were likely to be at home. However, it was very difficult to get anthropometric measurements of the fathers and other men because they left home early in the morning and did not reach home till late in the evening. The anthropometric measurements of the fathers and other men could be obtained despite repeated efforts.

In all enrolled families, anthropometric measurements were carried out on under-five children, their mothers and other family members who were available at the time of

data collection. Weight was measured using a digital balance (with an accuracy of 100g) in all family members including infants. Balances were checked every day for accuracy by weighing standard weights and repeatedly weighing two persons five times in the balance. Only those accurate balances (balances showing ± 100g difference in weight as compared to standard weights and measurements in the same person) were used to measure weight in the community. Infants and children who could not stand erect took length by using an infantometer (accuracy of ± 0.1 cm) and children who could stand erect and other family members took height using a stature meter.

Dietary diversity and household food security

NSSO method [16]: the amount of foodstuff purchased by the family (daily eg milk), alternate days, or weekly (eg fruits, vegetables), once a fortnight, or once a month (cereals, pulses oil, sugar, etc) for each of the major categories of foodstuffs was tabulated. Actual amounts purchased and the period over which they were used were ascertained and consumption for each of the major foodstuffs/CU/Day was computed.

NNMB method [17]*:* NNMB surveys collect data on foodstuffs used in cooking the family meals on the previous day using 24-hour dietary recall. Actual amounts of foodstuffs used in cooking the meals for the family were ascertained and consumption for each of the major foodstuffs/CU/Day was computed.

The data on the consumption of foodstuffs/CU/day calculated by NSSO and NNMB methods were compared with each other and also compared with the foodstuffs in a sample balanced diet (for sedentary men) provided in Nutrient requirements for Indians (2020) [18]. Indian food composition tables were used to compute the carbohydrate, protein, fat and energy/CU/day from food group consumption/CU/day (by NSSO and NNMB methods). The macronutrient and energy consumption/CU/day computed by NSSO and NNMB methods were compared with each other and with the EAR for energy recommended by the ICMR Expert Group on Nutrient Requirements for sedentary reference man weighing 65Kg (CU1). The ICMR expert group had suggested that in the dual nutrition burden era, the EAR for the actual average optimal weight of the population may be computed for energy requirements. The average height of men in India (based on AHS and DLHS4 surveys) is 162 cm; the optimal BMI for Indians recommended was 21kg/m^2; the computed optimal weight for the

average Indian man is 55 kg. The EAR for energy for 55 kg sedentary man was computed and compared with the energy consumption of the families/CU/day.

Physical activity

Physical activity in the persons was assessed using a modified WHO physical activity questionnaire (WHO, 2003). Time spent and intensity (sedentary, moderate, and vigorous) of activity in the household, occupational, transport, personal/ grooming, entertainment and discretionary activity domain was ascertained in detail. Time spent sleeping was also recorded. Based on this 24-hour physical activity recall hours spent in sleep, sedentary, moderate and vigorous activity was computed. Information on physical activity using 24 hours physical activity recall was collected in an of above five aged members of sub-sample households.

Inclusion criteria

Family should be from the low-income group, the family should have at least one under-five child, likely to continue to reside in the area for at least 1 year and willing to participate in the study.

Exclusion criteria

Families belonging to the high-income group, families without under-five child, not likely to stay in the area for 1 year and not willing to participate. Households with pregnant mothers were also not included in the study.

Data Entry, Cleaning and Analysis

Data were entered in four different sheets in Microsoft Excel 2013. The sheets are given below-

- Under-five children entry format
- 5-19 aged and adult's data entry format
- Household food security entry format
- 24 hours Physical Activity questionnaire entry format

Cleaning of data

Check all four entered excel sheets. If any row and column were blank or error, check from hard copy and fill the blank or correct if data is a wrong entry.

- Under-five data and 5- 18 aged children data run in software WHO Anthro and WHO Anthro plus respectively. The software helps to perform a comprehensive analysis of anthropometric survey data for children 0-18 years of age based on weight and height. The Outputs include a set of z-scores for four of the anthropometric indexes: height-for-age, weight-for-age (not for 10 to 18 aged children) and body mass-index-for-age. Data was checked whether all data have z score.

- All outliers were removed because WHO recommends for removal of outliers. The cutoff given by WHO is -5SD and +5SD for WAZ. Median values of weight in Indian children were around -2SD of the WHO standards (WHO, 2006). On the basis of this, cutoff for identification of outliers for weight for age was +3 SD (5 SD above -2SD) and -7 SD (5 SD below -2SD). All the values lying between the cutoff were taken for analysis of data.

Data Analysis

Means and standard deviations were calculated for continuous variables; for categorical variables per cent, prevalence was computed. The nutritional status of 0-18 years children was assessed using the WHO Anthro and WHO AnthroPlus software. Under-nutrition in 0-18 years children has been defined as BAZ<-2 SD and over-nutrition as >+2 SD BAZ. Prevalence of under-nutrition (stunting, underweight, and wasting) was computed in children. By using the WHO cut off points adult women and men were classified as undernourished (BMI<18.5), normally nourished (BMI 18.5 to 24.9) and over-nourished (BMI≥25).

Although the data was collected on a monthly basis throughout the year but for this study only single full anthropometry data of individuals from the yearly data was used. During the pilot study, when data was used to calculate the sample size, data were also analysed to assess the grade shift of individuals throughout the year. The data showed that there were only less than 5% of individual who shows grade shifting from 1st visit of the year to the last visit in a year.

There were many members in the same household such as under-five children, their mother and father, another school/college-aged siblings, other adult men and women. On the basis of unique HHUID (a unique 6 digit number made by the combination of 1 digit of area code, 2 digits of Anganwadi code and 3 digits of the household

number) arranged data. One household is given only one row on MS Excel sheet and accommodates all members in the same household in one row. It helped to make pair of family members. Pairs were

- Under-five child and mother
- Under-five child and father
- Under-five child and other women
- Under-five child and other men
- Elder and younger under-five children
- Under-five child and 5-9 aged children
- Under-five child and 10-18 aged children
- Mother and father of under-five child
- Mother and other women
- Mother and other men

Statistical analysis

Statistical analysis was carried out using MS Excel 2013 and SPSS version 27. Means and standard deviations were calculated for continuous variables; the prevalence was computed for categorical variables per cent. Prevalence of under-nutrition (stunting, underweight and wasting) was computed and intra-family differences in under-nutrition for pairs of all members from the same family were assessed. The nutritional status of the mother and other adults (under-nourished, normal, and over-nourished) from the same family and comparisons between groups were made. The student t-test was used to assess the statistical significance of the observed inter-group differences in the continuous variables; the Chi-square test was used to assess the statistical significance of observed inter-group variations in categorical variables.

Sample Size

There is no information available on intra-family differences in nutritional status between preschool children, and their mothers in the family in urban low-income group families in Delhi. An earlier NFI study on morbidity nutrition interactions in the same community showed that the least intra-family difference in nutritional status of 10% was seen in wasting between two under-five children in the same family. The sample size was calculated using a 10% difference in wasting in under-five children, a

margin of error of 5% confidence level of 95% and a design effect of 2. The sample size was 1000 children.

RESULTS

SOCIO-DEMOGRAPHIC PROFILE

The total number of households enrolled for the study was 5148. Analysis of data on the socio-demographic profile of households showed that the majority were nuclear families (58.5%). The percentage of fathers who had secondary school education was (74.1%) and mothers (56.3%). had. The majority of the fathers were semi-skilled workers (60.2%); 1/5th worked in white-collar jobs.

Majority of women were homemaker (93.6%). Around 81.1% of households lived in brick and mortar buildings; 45.7% owned their houses; the rest were mostly migrant labourers who lived as tenants in one or two room tenements. Piped water supply at home was available in 77.8% of households or in the near vicinity and access to flush toilets either in their own home or shared with other households. Almost all used Liquefied Petroleum Gas (LPG) and stainless steel utensils for cooking. 96.8% of households owned a colour TV, which was their main source of entertainment.

FOOD SECURITY STATUS OF THE FAMILY

Information of the amount of foodstuffs purchased and consumed by the families in major food groups computed by NSSO method [16]. All families had purchased cereals, pulses, roots and tubers, other vegetables milk, oil and sugar during the reference period. About 1/4th were vegetarians and did not buy any animal products. Computed amount of foodstuff consumed/CU/day was compared with the Balanced diet for sedentary men for reference man (weight 65 kg) and average Indian man (weight. 55kg). Roots and tubers, milk, oil consumption were higher than the balanced diet for reference sedentary men. Except for pulses, Green Leafy Vegetables and fruits the consumption per CU/day were equal to or higher as compared to the balanced diet for the average sedentary man.

Information of the amount of foodstuffs cooked/CU on the previous day and consumed by the families was computed by NNMB method [17]. There was good concordance in the amount of foodstuffs consumed/CU/day between the NSSO method and the NNMB method in those foodstuffs consumed every day. Consumption of roots and tubers, milk and oil was much higher than the balanced diet

for reference sedentary men. Except for pulses, Green Leafy vegetables and fruits the consumption per CU/day were equal to or higher as compared to the balanced diet for the average sedentary man.

The macronutrient content of the foodstuffs consumed/CU/day was computed using the nutrient composition tables. There was very good concordance between the carbohydrate, protein, fat, and energy consumption computed by NSSO and NNMB methods [16,17]; the differences in the mean carbohydrate, protein and energy consumption between the two methods were small but were statistically significant; however, the magnitude of the difference was too small to be physiologically significant.

The mean energy consumption by both the methods was lower than the EAR for reference man (2110 Kcal/day) but higher than the EAR for average Indian (1760Kcal/day). About one-fourth of the families consumed ≥ 2110 Kcal/CU/day (EAR for energy for sedentary reference man); over 75% of the families consumed ≥ 1760 Kcal/CU/day (EAR for energy for sedentary average Indian).

PHYSICAL ACTIVITY LEVEL OF FAMILY MEMBER

Physical activity for preschool children we did not undertake because infancy and early childhood physical activity and sleep patterns are radically different from older children, so we did not take into account the physical activity of under-five children.

Physical activity in the five-plus children and these are the findings. We had taken 24 hours of physical activity of adults by the using same performa used for five-plus children. In adults reproductive-aged that are younger mothers find the same physical activity because they are looking after households chores as well as looking after their children. Elderly women that are 35 plus mothers or mother in law do not participate in these activities and therefore they are even more sedentary spend more time sitting and talking. The dietary eating pattern as far as very young children of concerned exclusive breastfeeding rate is good, complementary feeding rate is good, there is no food inadequacy. They are food secure families. However, wasting rates of 10 per cent is there in young children. Overnutrition rate of about 5 per cent also exists in under-five children. As they grow older undernutrition rate goes up and the overnutrition rate disappears there is because of the growth dynamic. They have adequate food because they are growing energy needs are fulfilled so there is no

reason for overnutrition. Mothers because of activity connected to households chores and looking after children are gaining weight no doubt otherwise physical activity is low but they are not gaining weight at such a rapid rate and consistence rate as older women do. Older women do not participate in household chores and care of children. They are extremely sedentary so they are becoming over nourished. Therefore physical activity differences in women and growth-related energy requirements for school children are responsible for the difference in nutritional between women and children.

COMPOSITION OF FAMILY

There were 5148 families with 6539 under-five children (some families had more than one under-five child), 5303 mothers (some mothers had more than one preschool child),636 under-five's fathers,1288 other women (mostly grandmothers and aunts),465 other men (mostly grandfather and uncle). 734 children between the age group of 5-9 years and 376 children of 10-18 years.

ASSESSMENT OF NUTRITIONAL STATUS

a) Nutritional Status of under 18 years children-

Mean of WAZ, HAZ, BAZ in 0-4 and 5-9 years children. For 10-18 years HAZ and BAZ were calculated. There was a progressive increase in mean height and weight in the three age groups. Mean BMI was similar in the 0-4 and 5-9 year groups but was substantially higher in the 10-18 year age group. This increase in BMI-with-age is due to the increase in muscle and fat mass in children as they become older. Similar trends in BMI with age have been reported in AHS CAB [15] and DLHS 4 [13].

Indian children are small statured; their median height-for-age and weight-for-age are near -2SD of WHO standards for height- and weight-for-age. However median BMI-for-age of Indian children is around -1SD WHO standards for BMI-for-age [19]. This difference between indicators used for assessment of nutritional status in children is reflected in the mean z scores for height, weight and BMI.

In all three age groups the mean HAZ, WAZ and BAZ were in the negative range. The negative mean z scores for height (range -1.3 to-0.9) and weight (-1.1. to-1.0) were higher as compared to the negative mean z scores for the BAZ (range -0.6 to -0.4). The differences in the mean HAZ, WAZ and BAZ between 0-4 and 5-9 year children were statistically significant. The differences in the mean HAZ, and BAZ

between 0-4 and 10-18 year children were statistically significant. The difference in the mean HAZ between 5-9 and 10-18 year children was statistically significant.

In the dual nutrition burden era, BMI-for-age is the most appropriate indicator for assessing the nutritional status of children, especially in countries like India with high stunting rates in children. The WHO Anthro classifies 0-4 year children as over-nourished if BAZ was >+2; WHO Anthro Plus has classified 5-18 year children as over-nourished if BAZ was >+1. If the classifications of over-nutrition suggested by WHO Anthro for 0-4 years and WHO Anthro plus 5-18 years were used, there were substantial and statistically significant differences in over-nutrition rates as assessed by BAZ between 0-4 and 5-9 years as well as 0-4 and 10-18 year age groups. However, the differences in over-nutrition between the 5-9 and 10-18 year age groups were small and statistically not significant.

b) Nutritional Status of Parents

The mean age of fathers was higher by five years compared to the mothers' age. Fathers were taller by 13.2 cm and heavier by 14.4 kg as compared to the mothers. Fathers had a higher mean BMI as compared to their mothers. The higher body weight and BMI in the fathers in whom we were able to take anthropometric measurements might in part be because they were older by five years and many of those whom we measured had sedentary jobs near home or were not working full time. Only 10.8 % of the mothers and 3.9% of the fathers were under-nourished. About half of the mothers and fathers were normally nourished. The prevalence of over-nutrition in fathers and mothers was high. 35.4% of the mothers and 49.8% of the fathers were over-nourished.

c) Nutritional Status of other men and women

The mean age was similar for other men and other women. Other men were taller by 13.5 cm and heavier by 8 kg as compared to the other women. The mean BMI of other men and women was 26.1 kg/m^2 and 25 kg/m^2 respectively. It was seen that the mean BMI was almost similar to other women and men. The under-nourished rate in other women was 6.7% but a little higher 8.4% was seen in other men. The prevalence of over-nutrition in other women and other men was high (mention how much). About 37.2%of the other women and 46.8% of men were over-nourished.

INTRA-FAMILY DIFFERENCES IN NUTRITIONAL STATUS

a) **Mother and their preschool children (6539 pairs)-** A comparison of the nutritional status of mothers and their children are shown that there was a gradient in nutritional status of children as assessed by height-for-age, weight-for-age and BMI-for-age about the nutritional status of the mother as assessed by BMI. Stunting, underweight and wasting rates in children were highest when the mothers were under-nourished and least when the mother was over-nourished. However, even when the mother was under-nourished 13.8% of the pre-school children were wasted and around 86% were normally nourished.

b) Under-five children and father (636 pairs)- A comparison between the nutritional status of the father and their pre-school child shows that there was no gradient between paternal BMI and nutritional status of the under-five children. Stunting rates in children were highest when the father was normally nourished. Underweight and wasting rates in the children were similar when the father was under-nourished or normally nourished. Even when the father was under-nourished only 12% of the pre-school children were wasted and over 88% were normally nourished.

c) **Under-Five children and Other women (2054 pairs) -**Comparison of nutritional status of under-five children with nutritional status of other women in the same family shows that in view of the large differences in nutritional status between the under-five child and the other woman in the family, there were no significant trends in the nutritional status of the child in relation to the nutritional status of the other woman in the family.

d) Under-five children and other men (670 pairs)- Comparison between the nutritional status of the other men and their pre-school child shows that there was no specific tends between other men BMI and nutritional status of the under-five children. Stunting, underweight and wasting rates in children were lowest when the other men were over-nourished. When the other men were under-nourished only 12.2% of the pre-school children were wasted and 87.8% were normally nourished.

e) **Elder and younger under-five children (1590 pairs)-** In some families, there was more than one under-five child. In these families, the nutritional status of the younger child was compared with the nutritional status of the elder child. If the elder child was stunted, underweight or wasted, the stunting,

underweight and wasting rates in the younger children were higher. All these differences were significant.

f) **Under-five and 5-9 aged children (931 pairs)-** If the 5-9 year aged child was stunted, underweight or wasted, the prevalence of underweight, stunting and wasting was higher in the 0-4 year sibling. These differences were statistically significant for WAZ and HAZ but not for BAZ.

g) **Under-five and 10-18 aged children (472 pairs)-** The differences in stunting and wasting rates between 10-18 years and 0-4 year children were small and not statistically significant.

h) **Mother and Other women (1689 pairs)-** A comparison of the nutritional status of mothers and other women shows that under-nutrition rates in the other women were higher when the mother was undernourished; however, even when the mother was undernourished 40.5% of the other women in the family were overnourished. When the mother was normally nourished 45.1% of the other women were normally nourished and 47.9% of the other women were overnourished. If the mother was over-nourished, 69.1% of the other women were over-nourished. All these differences were large and significant.

i) **Mother and father (636 pairs)** - A comparison of the nutritional status of mothers and fathers (as assessed by BMI) shows that the prevalence of under-nutrition in fathers was higher if the mother was under-nourished. Prevalence of over-nutrition in fathers was higher if the mother was over-nourished. However, even if the mother was under-nourished more than one-third of the fathers were over-nourished. Even when the mother was over-nourished about 2% of the fathers were under-nourished.

j) **Mother and other men (670 pairs)-** A comparison of the nutritional status of mothers and other Men (as assessed by BMI) shows that the prevalence of under-nutrition in other men was higher if the mother was normal-nourished. Prevalence of over-nutrition in other men was higher if the mother was over-nourished. Prevalence of under-nourished in other men was almost similar if the mother was over-and under nourished. However, even if the mother was under-nourished one-third of the other men were over-nourished.

k) Differences in nutritional status of all family members in a household

Based on the data on nutritional status as assessed by BMI in adults and BMI for age in children, families were classified into different categories. All

members of the family were normally nourished in over a third of the families. All members of the family were under-nourished or over-nourished in 1% or less of the families. In over 60% of families, there were differences in the nutritional status of persons in the family: both under- and over-nutrition coexist in the family. In the context of dual nutrition burden within families, there is a need to add to a component of screening all members of the family to identify and manage both under- and over-nutrition in all ongoing programmes to improve nutritional status.

DISCUSSION

In the seventies of the last century poverty and food insecurity were the major factors responsible for undernutrition and under-nutrition was seen in all members of the family. Most of the intervention programmes aimed to identify families below the poverty line and provide them with goods subsidised food grains, free food supplements through ICDS and Midday meal programmes to improve energy intake and health services to treat infections [2]. Over decades there has been a reduction in poverty and food insecurity, but the reduction in children undernutrition has been slow [5, 20] Simultaneously there has been a substantial increase in over-nutrition in adults among all segments of the population including the poor[20] In the current dual nutrition burden era, it is expected that there will be intra-family differences in nutritional status. Stunting and underweight rates in pre-school children were high and one-fifth of the children were wasted. Nutrition counselling for higher physical activity can halt and later reverse the already low over-nutrition rates in children. All adult tends to accept weight gain with increasing age as normal and seldom seek care. Nutrition and health education to all adults on the importance of monitoring weight gain and checking for hypertension and diabetes has to become a part of essential primary health care.

Data from NFHS 3 [10] showed that there are substantial intra family differences in nutritional status between the mother and her under-five children. Similar trends were seen in AHS CAB [15] and DLHS 4 [13]. The mean HAZ was lower in the 5-9 year age group as compared to the 0-4 year and 10-18 year age groups. Rapid linear growth in under-five children and adolescents may be responsible for the observed

differences. BMI for age is the most appropriate indicator for assessing the nutritional status of 0-18 year children. Data from the present study showed that the prevalence of overnutrition is substantially higher in school-age children as compared to preschool children. A comparison of undernutrition between children from the same family showed some interesting findings. Irrespective of the parameter (stunting, underweight or wasting) or the age group (under five, 5-9 or 10-18 years) the prevalence was higher in younger siblings of undernourished elder siblings. This is because they share some of the major factors responsible for undernutrition in children such as small parental stature and low dietary intake and poor environmental sanitation.

Almost all households had ration cards and purchased subsidised food grain. Income earned was usually sufficient to take care of their essential food, shelter, education and health care needs. Men and women did not access health care unless they fell ill. Food frequency data indicated that cereals and roots and tubers (mainly onions and potatoes), other vegetables, milk and milk products, fats and oils, and sugar were consumed every day. There was good concordance between NSSO and NNMB methods [16,17] in terms of computed carbohydrate, protein, fat and energy consumption/ CU/day.

The energy intake/CU/day computed using 24-hour dietary recall was lower by 210 Kcal as compared to the EAR of sedentary reference man but higher by 140 Kcal when the EAR for average weight sedentary man was considered. This is because, on the day when animal foods were prepared, an adequate amount needed for the family was cooked and shared; but since animal foods were consumed infrequently, the daily average amount computed from the purchased amount was lower.

CONCLUSION

These data suggest that maternal and paternal under-nutrition and low height are associated with higher child under-nutrition and stunting respectively. However, even when the mother or father was short or under-nourished, the majority of the children were normal in height and normally nourished. Prevalence of under-nutrition in 0-18 year children remains high; the prevalence of over-nutrition as assessed by BAZ is still low in the 0-18 year children. The risk of under-nutrition in a younger child is higher if the elder child is under-nourished, but concordance in nutritional status

between children in the family is relatively low. In view of the intra-family differences in nutritional status, it is essential to undertake an assessment of the nutritional status of each member of the family and provide appropriate nutritional advice and intervention.

Among food secure urban low-income group families, the prevalence of wasting (BMI in adult women and BMI for age in under-five children) in preschool children and women is low. In the current dual nutrition burden era, it is imperative to operationalize universal screening of all women and children for early detection of wasting and over-nutrition. Effective management of wasting with food supplements and health care can bring about a substantial reduction in under-nutrition in women and preschool children. The prevalence of over-nutrition in women is high mainly due to a sedentary lifestyle. Increasing discretionary physical activity can help in halting the rise and perhaps later reversing overnutrition in women and reducing the risk of non-communicable diseases.

POLICY AND PROGRAMME IMPLICATIONS OF THE FINDINGS

Intervention programs aimed at improving food security and reducing undernutrition have so far used families below the poverty line as the unit for interventions. Data from the study showed that there were substantial intrafamily differences in nutritional status across all age groups and both sexes in the urban low-middle income families.

Data from the present study indicate that there are substantial differences in nutritional status between siblings in the same family . Though prevalence of undernutrition is higher in younger siblings whose elder siblings are undernourished, majority of the younger siblings whose elder siblings are undernourished are normally nourished . In view of this it is imperative that all children in the family should be screened to ensure that under-nourished children are identified and appropriate intervention provided.

The protocol of community based management of undernutrition in under five children envisages that all children will be screened for undernutrition, undernourished children will be provided with appropriate ICDS supplements and

monitored. Effective implementation of this protocol may help in accelerating reduction in undernutrition

In the context of dual nutrition burden in adults, there is a need screen all adult members of the family to identify and manage both under- and over-nutrition. Hypertension and diabetes occur at a younger age and at a lower BMI in Indians .

Non communicable diseases are asymptomatic in their early stages; symptoms appear only when the complications set in . Early detection of NCD by simple tests is possible in the health and wellness centres. All adults should also be screened for hypertension and diabetes in the health and wellness centres so that those with NCDs are identified in the early in the asymptomatic period and given appropriate care so that complications are prevented .

STRENGTH OF THE STUDY

This community-based study assessed intra-family differences in nutritional status between preschool, their mother, father, school/ college-aged children and other adult members of the households during the dual nutrition burden era in a setting where a high prevalence of under-nutrition in 0-18 aged children coexisted with a high prevalence of over-nutrition in adults.

It is a community-based study that investigated food consumption patterns and amounts in urban low middle-income families.

This community-based study assessed physical activity patterns in above 5 aged members of the urban low middle-income families.

LIMITATIONS OF THE STUDY

The study was conducted in only one urban location. The study was limited to urban low middle -income, food-secure families with ready access to health care. The findings from this study may not apply to families in other urban and rural communities with varying levels of food insecurity and access to health care. Data were available in relatively very few school-age children and men and may not be representative of the findings in these groups. The findings may apply only to the pre-COVID pandemic period; findings may differ if the study is conducted in the COVID-19 era.

The focus of the study was on defining the magnitude and determinants of intrafamily differences.

As and when under-nourished children were detected, nutrition education regarding appropriate feeding practices, health education on seeking health care during infections were provided. The research team facilitated accessing the anganwadi food supplementation. Implementation of the interventions for these children and monitoring improvement was done by the frontline functionaries of the ICDS/health care systems according to their guidelines and practices.

As and when under-nourished or over-nourished adults were detected, appropriate nutrition and health education was provided. The research team facilitated the over-nourished person's access to health facilities. Adults accessed health facilities according to the convenience of the families. Health facilities followed their guidelines and practices for management of hypertension and diabetes.

The coverage, content and the quality and impact of these interventions provided under service conditions was not assessed.

SCOPE OF FUTURE RESEARCH

Data from the present study showed that undernutrition in children continues to be high. In view of the substantial intrafamily differences in the nutritional status between children from the family it is imperative that all children are screened by anthropometric indicators to assess their nutritional status and appropriate interventions to improve their nutritional status are initiated. Due to limitation of time this could not be attempted in the present study

The Govt of India in Oct 2023, drew up the protocol for community management of under-nutrition in children. The protocol envisaged that growth monitoring will be done in all under-five children; those identified as having moderate (<-2 z score) or severe under-nutrition (<-3 z score of weight for age or weight for height of the WHO growth standards) who are not having any medical problems will be treated in community settings as per the existing ICDS food supplementation norms for under-nourished pre-school children. The protocol is being operationalised in a phased manner.

Research studies have to be initiated to assess operationalisation of the protocol, the coverage under various components and impact of these interventions on the nutritional status of children . These studies could provide inputs for appropriate midcourse corrections in the ongoing programmes and accelerate the impact in terms of improvement in nutritional status of children .

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