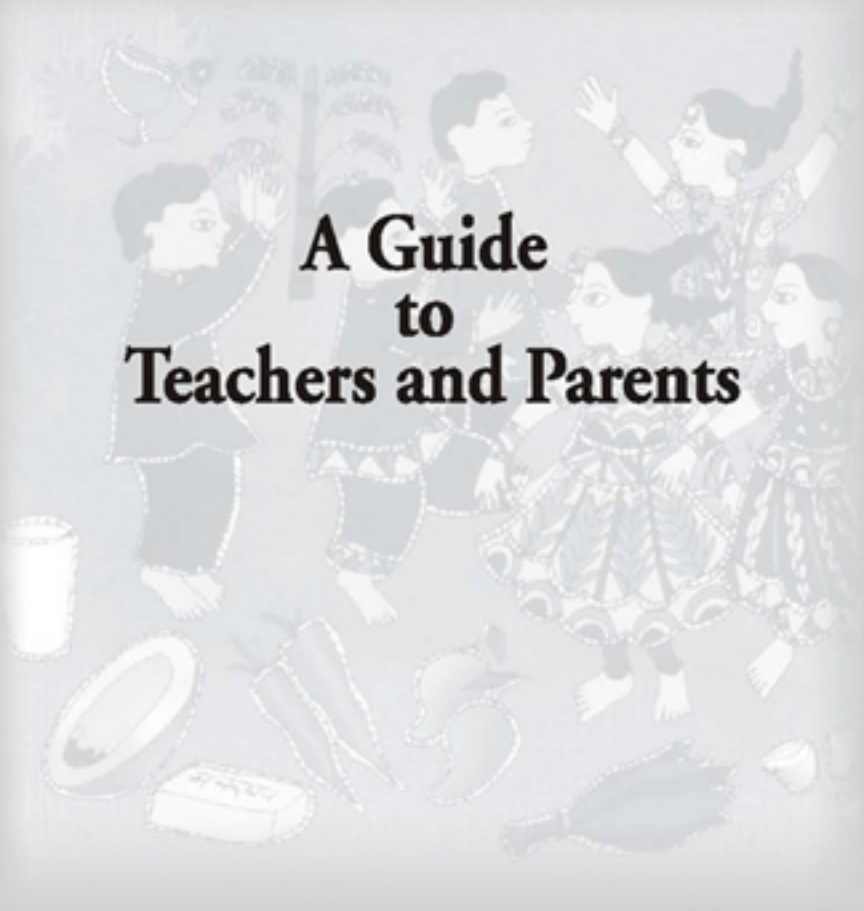
Be Fit Not Fat

Fitness Mantra for Children



A Guide to Teachers and Parents

International Life Sciences Institute-India
ILSI – India

ABOUT ILSI-INDIA

ILSI-India is a branch of International Life Sciences Institute (ILSI) with headquarters in Washington DC. ILSI is a non profit, worldwide foundation established in 1978 to advance understanding of scientific issues relating to nutrition, food and water safety, toxicology, risk assessment, and environment by bringing together scientists from academia, Government, industry, and the public sector. ILSI has 15 regional / country branches across the globe. ILSI has special consultative status with the Food and Agriculture Organization of the United Nations and it is also affiliated to World Health Organization as a non-governmental organization. ILSI India works on issues relating to nutrition, food and water safety, risk assessment, biotechnology and environment. It works very closely with industry, R&D organizations, government departments, and international organizations like FAO, WHO, WFP and UNICEF. Child health is a special focus area of ILSI-India. Programs have been conducted on nutrition needs as also child obesity.

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Contents

Introduction

There has been a sharp increase in the incidence of overweight and obesity in many parts of the world. First time in human history, the size of overweight population has become equal to the size of underweight population, at 1.1 billion each.

It is a matter of concern that not only the adults but also children and adolescents are increasingly becoming overweight and obese. About 50-80 % of obese children become obese adults, who are at higher risk of diabetes, arthritis and cancer.

The causes for increasing incidence of overweight and obesity are complex and are linked to a variety of social, economic and lifestyle changes that have combined to upset the balance of energy intake and expenditure.

India has more diabetic patients than any other country in the world and it is predicted that CHD will soon become the leading cause of death in India. It is now emerging convincingly that these disorders begin in childhood (or even earlier, in fetal life). Therefore, if India has to avoid the epidemic of overweight and obesity, the efforts have to start in childhood itself.

Keeping the above in view, ILSI-India organized a Conference on "Management and Prevention of Childhood Obesity through Nutrition Strategies and Physical Activity" and invited leading national and international experts on child obesity, nutrition and physical activity to discuss the problem.

This monograph is based on the presentations made at the Conference and select relevant studies. The monograph also outlines the steps to be taken by the various stakeholders particularly parents and teachers to ensure that the problem of overweight and obesity could be nipped in the bud and the lives of millions of children saved from the health complications that emerge later in life.

1 - Obesity And Its Prevelence

What is Obesity ?

Obesity is defined as a condition of abnormal or excessive fat accumulation in the body. The commonly used measure of obesity is the Body Mass Index (BMI). It is the ratio of weight in Kgs. to the square of height in meters, e.g. if the height is 1.2 meters. and the weight is 55 kgs, the BMI will be $55/1.2^2 = 38.2$.

The cut off points for overweight and obesity in adults (both males and females) are BMIs of 25 and 30 respectively. However, for children the cut off points for overweight and obesity will be different at different ages and will be different for boys compared to girls due to growth (changes in height and weight with age) and physiological changes. For this reason a different method is adopted to identify cut-off points for overweight and obesity in children to correspond to adult cut off points of BMIs 25 and 30.

BMI-for-age percentile charts are deigned specifically for children from two to 18 years. These are used as well as the weight and height growth charts to give a more accurate picture of a child's development. It is important that a child's BMI be compared against his or her age and gender percentile charts.

Many countries have published BMI for age charts for their population and some have also specified cut off points on these charts to define overweight and obesity. At the same time NCHS / CDC charts of USA and International Obesity Task Force's charts are widely used to measure incidence of overweight and obesity in children. The NCHS / CDC charts from USA uses 85th and 95th percentiles of BMI as reference points for overweight and obesity respectively in children.

International Obesity Task Force (IOTF) has published age and sex specific BMI cut off for defining overweight and obesity in children based on pooled international data for BMI and linked to the widely used adult obesity cut off points. This definition is less arbitrary and more international than others, and should encourage direct comparison of trends in child obesity world wide.

In India researchers have widely used NCHS / CDC charts or IOTF definitions to measure overweight and obesity in Indian children. However, since it has been observed in studies in India that the BMI values corresponding to body fat of 25% in boys and 30% in girls are significantly lower than the cut offs for obesity proposed by International Obesity Task Force. **Since Indian children and adolescents have higher percentage body fat at lower BMIs there is a need to establish**

overweight values obtained among children and adolescents. This implies that the number of children who are considered as overweight and obese using international definitions will increase once cut off points for overweight and obesity are defined for Indian children.

BMI is not the only criterion for measuring overweight and obesity but is a fairly reliable indicator of adiposity in most youths and adults.

Prevalence of Overweight and Obesity in India

India is undergoing an epidemiological transition with increasing affluence - one of the causes for increased incidence of obesity. Various studies from India show the high prevalence of obesity particularly in urban areas. There is no survey reflecting country-wide prevalence of obesity in India. Some selected studies in large metropolis are given in Table 1.

Table 1: Prevalence of Overweight and Obesity in Children in Select Indian States Middle and High Socio Economic Status (MHSES) Groups

S. No.	Region, N(Ref) [Year of data collection]	Age in years	Overweight (%) Total	Overweight (%) Boys	Overweight (%) Girls	Obsity (%) Total	Obsity (%) Boys	Obsity (%) Girls
1	Chennai, N=4700 * [July-Nov. 2000]	13-18	-	17.8	15.8	—	3.6	2.9
2	Delhi, N=5000 * [2000]	4—18	29	-	-	6	-	-
3	Delhi, N=3861* [2001]	10—16	24.7	23.1	27.7	7.4	8.3	5.5
4	Chennai † 1981, N=707]** [1998, N=610]	10—15	9.62 9.67	- -	- -	5.94 6.23	- -	- -
5	Punjab, N=2008 ‡ [1999]	9—15	14.2	15.7	12.9	-	-	-
6	Pune, N=1228* [2003]	10—15	19.9	19.9	-	5.7	5.7	-
7	Punjab, N=640¶ [2000-2001]	10—15	10.9	9.9	12	5.6	5	6.3
8	Baroda, N=5329† [2001-2004]	12—18	8.5	8	9	1.5	1.4	1.7
9	Delhi, N=41[1] [2006]^ 19739 Private schools (USES)[2] 21568 Govt. schools (LSES)[3]	5-18 16.75	19.01	2.66	5.59 2.14	5.73	0.42	0.28

Source: S.No.1-8: Indian Pediatrics, Vol. 43, Nov. 17, 2006, and Page 946; and S.No. 9: Vol.44-March 17, 2007; page 208

* Overweight classified as BMI≥25-29.9 kg/m^2 Obesity classified as BMI ≥30 kg/ m^2

† Overweight classified as age and sex-specific BMI (≥85-95th percentile Obesity as ≥95th percentile as per IOTF standards

‡ Overweight classified as age and sex-specific BMI≥85-95th percentile Obesity as ≥95th percentile as per WHO standards

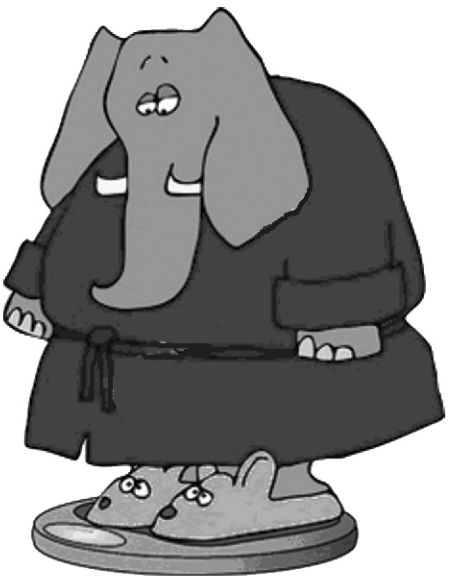
¶ Overweight classified as age and sex-specific BMI≥85-95th percentile as per Must, *etal*, standards.

** Comparison between two studies one in 1981 (Group I) and the other in 1998 (Group II). No Statistically significant change in prevalence of overweight and obesity between the two groups.

^ Overweight and Obesity as per IOTF Definitions

2 USES – Upper Socio Economic Group, Private Schools

3 LSES – Lower Socio Economic Group, Government Schools
Year in parentheses indicates time of data collection.



2 - Causes of Overweight and Obesity

Genetic Factors

Genetic characteristics may increase an individual's susceptibility to overweight. Low birth-weight and size at birth resulting from poor maternal nutrition, stunting in childhood, gestational diabetes in pregnant women exposes children to overweight and obesity.

Prolonged and exclusive breast feeding is associated with a significantly lower rate of overweight and obesity.

Abdominal obesity has also been associated with retarded growth in foetal life and, subsequently, during infancy. Higher BMI and waist hip ratio have also been associated with decreased growth during infancy.

Indians are more susceptible to obesity because of 'thrifty genes'. However, genetic susceptibility has to co-exist with other contributory factors such as a high-calorie food intake and lack of physical activity to cause obesity.

Obesogenic Environment

Childhood and adolescence are critical periods for the emergence of obesity. The causes that underlie this imbalance are complex. Simply said, obesity is an unintentional consequence of energy imbalance between calories consumed and calories expended, the two most striking being increased food intake and decreased physical activity.

"A world where it is hard to move, but easy to eat"

DIET

There has been a shift in diet towards increased intake of energy dense foods high in fat and sugar laden beverages. These foods may easily help to meet an individual's daily energy requirements but are usually low in vitamins, minerals and other micronutrients. Children's access to such foods has rapidly increased with the proliferation of fast food restaurants and availability in schools. **A study conducted by *Delhi Diabetes Research Centre* reported that two-thirds of youth in Delhi prefer hamburgers, pizza and French fries to green vegetables.**

Pizzas, burgers, bread pakoras, samosas, and sweets like cake, pastries, burfi, gulab jamun, rasgulla are high calorie foods. The following table provides information on the calorific value of some of the fast foods

With affluence, the frequency of eating out has increased, so also spending power of kids. A study conducted by Cartoon Network in India reported that average monthly pocket money of children is Rs. 154, which varies across the country from Rs. 139 (Banglore) to Rs. 202 (Mumbai). Increased pocket money combined with increased preference for energy dense foods is an important cause of obesity in children.

PHYSICAL ACTIVITY

With increased affluence and advancement in technologies there is a change in the modes of entertainment. Children spend more time with computers, video games, play stations, television – mostly sedentary activities - than any of the outdoor sports. A study by Delhi Diabetes Research Centre has reported that:

- Only 8% of children spend an hour a day on physical activity,
- 42% spend an hour watching television or playing computer games, and
- Only about 25% spend an hour doing anything outdoors.

Table 2: Calorific Value of Certain Fast Foods

Foods	Calories	Foods	Calories
Kachori (1 small)	200	Vegetable Chowmein (1 Plate)	413
Veg. Patty (1 piece)	260	Pizza (1 slice, medium)	150
Potato Vada (3 small)	170	Chicken nuggets (3)	160
Samosa (1 big)	210	Chicken Burger (1)	450
Dahi Vada (2)	345	French Fries (medium)	292
Fresh lime with 2 spoons sugar (1 glass)	55	Cola (medium)	170
Mixed Vegetable Pakoras (1 Plate)	350		

Studies done in other cities support the above finding of decreased physical activity in children. For example, National Institute of Nutrition pilot study of children in Hyderabad reported that the proportion of children participating in physical activity was less than 40%.

Overweight and obesity, it was found, was higher among the children who did not participate in regular physical activity. Prevalence of overweight was 3 times higher in children, not participating in outdoor games and 1.92 times higher in those watching television.

An increase in physical activity is associated with decreasing BMI and conversely, an increase in inactivity is associated with increasing BMI ***(Annexure I).*** Each hourly increment of TV viewing by adolescents is associated with 2% increase in prevalence of obesity. As much as 60% of the prevalence in overweight could be attributed to excess television viewing.

Environmental Factors

Environmental modifications are also contributing to energy imbalance in children. Motor vehicles, lifts, decreased participation in household chores, etc. reduce physical exertion.

- **Environment At Home**: Parents are role models for their children. They generally develop habits including food intake and physical activity patterns similar to their parents. **For food, maternal influence is the greatest. For physical activity, the influence is age-dependent.**
- **Environment at Child Care Centers**: Child care providers share responsibility with parents for children during important developmental years. Almost 80% of children aged 5 years or less, with working mothers, are in child care for 40 hours a week on an average. Child care can be a setting in which healthy eating and physical activity habits are developed.
- **Schools and other Educational Institutions:** Children spend substantial amount of time in schools and, like parents, teachers may be role models for children. However, National Focus Group on Health and Physical Education states that only about 12% of school teachers in schools have health education and more than 50% schools do not have facilities for sports, games and physical training. Teachers should educate children on good eating habits and the importance of keeping fit and healthy. Further, schools should support the infrastructure for regular physical activity. Coaching classes should not be at the expense of physical activity.

  School cafeterias are easily accessible to children and hence, the type of food and drink sold by them determine what children eat during school hours. It is important that cafeterias supply healthy foods.
- **City Environment:** Most cities lack sidewalks, safe bike paths, neighborhood parks, etc. As a result, children are discouraged from walking or biking to school as well as from participating in regular family physical activity due to poor environmental design.

4 -How To Prevent Obesity In Children?

Screening

Regular obesity screening must be introduced. This can be done through regular growth measurements (annually) in schools: Children should be monitored beginning at age two, in their preschool years, and on entry to primary and secondary schools for their height, weight together with some appropriate index of dietary and activity patterns. This way early intervention can be taken to avert overweight and its associated health risks. WHO has developed Child Growth Standards for children aged 2 to 5 years of age and is currently developing an international growth standards for school age children and adolescents.

Currently the Government policies for growth monitoring focus on children less than 5 years of age and it has been decided to use the recently released WHO growth standards for children up to 5 years of age **(Annexure II)**. In view of the fact that there are no policies for growth monitoring beyond the age of 6 years and growth monitoring differs greatly among pediatricians, the Indian Academy of Pediatrics has made consensus guidelines for growth monitoring of children upto 18 years of age as per IAP Action Plan (Indian Pediatrics – http:// www.indianpediatrics.net – Ref. Volume 44, March 17, 2007, Pages 187-197)..

Lifestyle Modification

The mainstay for management of obesity is lifestyle change. In order to do this successfully, frequent contacts for support and encouragement focusing towards a healthy balanced diet with reduction in high energy foods and increased physical activity are necessary.

The following strategy may be adopted for fitness:

1. DIET

Balanced diet is essential to sustain good health. Food contains many nutrients required to make the body grow, keep it healthy, and provide energy for work. Essential nutrients present in food are carbohydrates, proteins, fats and oils, vitamins and minerals, and of course water which is used for vital processes of the body. Protein is required to build muscle and tissue; carbohydrates and fats to supply energy; mineral allows to develop healthy bones and blood; and vitamins for healthy life and growth of the body. The functions of various nutrients and their sources are given in ***Annexure III.***

The recommendations for balanced diet for children and adolescent boys and girls incorporated in Food Based Dietary Guidelines of Indian Council of Medical Research, Ministry of Health is given in ***Annexure IV.***

3 - From Obesity to Infirmity

Major Health Consequences

Overweight and obese children and adolescent suffer from many of adult chronic degenerative diseases.

- **Cardiovascular Disease**

(Mainly heart disease and stroke): Increasing trend of hypertension is a worldwide phenomenon. The data on sustained hypertension in school going children is scanty in India. A study conducted in 3326 (2467: urban and 859: rural) healthy school children (11-17 yrs.) revealed that prevalence of sustained hypertension was 6.69% in urban population and 2.56% in rural population. Boys outnumbered girls in both rural and urban areas. None of the student with normal body mass index in rural area was found to be hypertensive. Blood pressure is frequently elevated in obese children as compared to lean children.

Overweight children have been found to have risk factors for cardiovascular disease (CVD), including high cholesterol levels, elevated triglycerides (blood fat), decreased HDL (good Cholesterol) high blood pressure, and abnormal glucose tolerance. In a population-based sample of 5- to 17-year-olds, almost 60% of overweight children had at least one CVD risk factor while 25 percent of overweight children had two or more CVD risk factors.

- **Type 2 Diabetes**

Recent research shows an increase in type 2 diabetes in obese adolescent children. About two-thirds of children with increased BMI develop insulin resistance, a step towards developing type 2 diabetes. The risk of developing insulin resistance triples with increase in BMI. Ethnic variations in the body fat distribution account for some of the observed differences in the metabolic syndrome and diabetes among various population groups.

It is feared that as the childhood population becomes increasingly overweight and less active, more type 2 diabetes may occur in younger prepubescent children. Additionally, children who are sedentary, overeat and have a family history of diabetes are more at risk of contracting type 2 diabetes.

It may be noted that diabetes can lead to major complications like blindness, kidney failure, CVD and neurological impairment.

Table 3: Incidence of Chronic Diseases in Overweight and Obese Children - Delhi

	Overweight	Obese
Fasting Hyperinsulinemia	10%	40%
Impaired Fasting Glucose	3.7%	6.5%
Impaired Glucose Tolerance	1.5%	5.5%

Brig. R K Marwaha (AMC): Detailed anthropometric, endocrine and metabolic evaluation of apparently healthy school children in Delhi. Submitted, International Journal of Pediatric Obesity

• Other health concsequences

Other health problems associated with obesity are breathing problems, sleep apnea (interrupted breathing while sleeping), asthma, gall bladder disease, depression, etc.

Overweight children and adolescents are targets of early social discrimination. The psychological stress of social stigmatization can cause low esteem which, in turn, can hinder academic and social functioning and persist into adulthood.

Economic Burden of Obesity

Overweight and obesity may involve direct and indirect medical costs. Direct medical costs include preventive, diagnostic and treatment services related to obesity. Indirect costs relate to morbidity and mortality costs.

Health care costs for obese children are three times that of the average child as obese children are three times more likely to be hospitalized than normal children. It has been reported that the health care cost per obese child in U.S. is over $1000 per year. Though no studies have been made about health costs in India, it can be estimated that health care cost of an obese child in India may be over Rs.9000/- per year.

NOW or NEVER: If immediate action is not taken, it won't be long until millions are gripped by obesity epidemic.

The Indian Council of Medical Research has worked out the Recommended Daily Allowance for different nutrients. This is given in ***Annexure V.*** Recommended Daily Allowance is defined as the intake of nutrient derived from diet which keeps people in good health.

Proper nutrition may enhance academic performance by:

- Reducing absenteeism and tardiness.
- Improving behavior, and emotional functioning.
- Improving reading scores,
- Reducing trips to the doctor.
- Lowering anxiety, hyperactivity, depression and psychosocial dysfunction.

Messages To Be Conveyed for Fitness of Children: Fitness Mantra

➢ **What to Eat?**

Healthy diet including whole grain, pulses and legumes, vegetables, fruits, lean meat, low fat dairy products, nuts and seeds need to be consumed regularly. ***(Annexure III, IV, and V)*** . Fast foods like burgers, pizzas, ice creams, fried snacks like samosas, vadas, pakoras, jalebis, cakes, and pastries should be taken rarely.

Generally there is a tendency in children to skip breakfast. However, it is important to start the day with a good breakfast. Recent findings from the University of Sydney, Australia, National Children's Nutrition and Physical Activity Study reported that children who skip breakfast or drink only fluids are significantly heavier than children who eat breakfast. The prevalence of overweight among school children who skip or do not have a proper breakfast is

- 1 in 4 children
- 1 in 5 primary school children.
- 1 in 2 female high school students.
- 1 in 3 children from low income groups.

An ideal breakfast and snack is one which is low in fat, high in carbohydrates, high in fiber, good source of proteins, and fortified with vitamins and minerals. A wholesome breakfast and snacks has:

- Whole grains which provide more fiber, vitamins and minerals
- Fruits and Vegetables which provide vitamins such as A and C, carbohydrate and fiber.
- Dairy foods which provide calcium, riboflavin, protein, and vitamin A and D.
- Foods which provide protein and iron such as poultry, eggs, beans, cottage cheese, nuts, etc.

➢ **What to Drink?**

- Plenty of water
- Low fat products like skim milk, lassie, chaach
- Natural beverages like sherbets with low calories.

- High calorie sweetened beverages like carbonated beverages, fruit juices, etc should be taken rarely.

Nutrient content of some select food items is given in **Annexure VI.**

2. PHYSICAL ACTIVITY

Physical activity in children is important for maintaining ideal weight, good bones and overall good health. It also prevents development of obesity and morbidity later in life. There is a lot of national data on benefits of physical activity in preventing overweight and obesity in children. However, NIN's study on children in Hyderabad has clearly underlined that children who are sedentary and do not indulge in physical activity are overweight and obese. Promotion of physical activity during childhood years should therefore, be considered as the top most public health priority.

Increased fitness & physical activity may lead to:

- Higher academic achievement
- Increased concentration, improved reading,

The World Health Organization has made the following recommendations for children:

- At least 30 minutes of cumulative moderate physical activity everyday (walking/brisk walking as well as other appropriate, healthy and enjoyable physical activities and sport for all actions), with children of all ages requiring an additional 20 minutes of vigorous physical activity three times a week (listings of activities contributing to light, moderate and vigorous activities are given in ***Annexure VII).*** Moderate intensity exercise of a non-structured nature facilitates most of the disease prevention goals and health promoting benefits.
- Restrict TV viewing, video games and use of computers to a total of $\leq$2 hours per day.

In addition, the Indian Academy of Pediatrics has also made some recommendations relating to promotion of physical activity in children. These include the following:

- Children should be encouraged to walk and play once he / she learns to do so.
- Discourage the use of prams once the child learns to walk.
- Parents should support their children's participation in appropriate, enjoyable physical activities.
- Familial participation in games and sports activities (e.g. walking, swimming and other recreational activities) should be encouraged.
- Children should be encouraged to participate in household jobs (e.g. walk the dog, dusting, cleaning cub-boards, watering plants in gardens, washing their playthings, bicycles and cars).
- Families should consciously reduce TV

viewing through education and behavioral techniques. TV viewing should be restricted to less than 2 hours.

- Instead of sitting at the table while doing home work, children should walk while practicing spellings, multiplication tables and general knowledge.
- Indoor games like dancing, games with action, e.g., hop-scotch and blind man's buff, should be encouraged.
- Physical education should be made compulsory in schools and college curriculum and withholding of physical activities as punishment in schools should be discouraged.
- Children should be encouraged to undertake one hour of physical activity daily.

5- Who Is Responsible For Change?

Family

Primary public health goal should be the development of a family-based prevention program as family is the focal point of child care and development. Successful intervention efforts must involve and work directly with parents, especially during early and middle childhood.

Parents can create a healthy and active environment for their children in following ways:

- Children must be made a part of grocery shopping.
- Children should participate in household chores.
- Parents must involve children in cooking and other food preparation activities.
- Family must eat all meals together on dining table.
- Parents must be good role models.
- Stock good and healthy foods like nuts, seeds, roasted snacks, fresh fruits and vegetables, low calorie foods at home.
- Eat out sparingly.

School

Since children spend most of their time at school each day, schools provide an ideal setting for teaching children and teens to adopt healthy eating and physical activity behaviors.

- Physical education in all school grades must be made mandatory for all students. Regular physical activity has been shown to improve concentration and academic performance. Schools must aim for at least 60 minutes of moderate physical activity every day for students.
- Activity level can be improved through encouraging sports, dancing, gardening, and other lifestyle behaviors.

Apart from sports and athletics, a number of physical activity and nutrition programs like TAKE 10!, Planet Health, SPARK, CATCH, etc. have been developed by many institutions. These programs vary in scope, cost and topics addressed. All are well evaluated curriculum tools addressing different age groups.

Some of the widely known school intervention programs include:

TAKE 10!:. TAKE 10!® (www.take10.net) is an innovative teaching tool, for grades K-5, that capitalizes on a child's natural desire to be active. The program, developed and validated by the International Life Sciences Institute Research Foundation, is designed to reduce sedentary time in the school day while promoting positive health messages about physical activity and nutrition. TAKE 10!® activities link academic curriculum requirements in math, science, language arts, and social studies with 10-minute periods of

physical activity. Teachers love the ease and adaptability of the activity cards and the fact that no additional space or resources are required to 'TAKE 10!®'. Students enjoy doing something new while creatively learning and being active.

POWER KIDS: The Power Kids (www.POWERKIDS.org.sg) program was created by ILSI Southeast Asian region in response to the need expressed by the Minister of Education in Singapore in 1999. The program has helped in effectively checking the rise of obesity in school children in Singapore. The program highlights more creative ways to teach children about healthy eating and benefits of regular exercise .

It was developed in 2 resource packages: ***Power Kids Eat Smart and Power Kids on The Go.*** Power Kids is being reviewed and considered for pilot testing by the Indonesian National Commission for UNESCO.

Lack of space in the schools for physical activities including sports can be compensated by obtaining permission to use public playground for children so that all students in the school avail of the physical education classes. Alternatively, interesting indoor activity programs can be introduced. ILSI's Take 10! Program provides how indoor physical activity can be promoted.

CREATING HEALTHY FOOD ENVIRONMENT:

Initiatives to encourage schools to eliminate 'fast foods', calorie dense snacks and high sugar beverages are critical. Schools should devise healthier menus. School cafeterias should offer some of the healthy foods like:

- Roasted snacks
- Whole Wheat bread
- Fresh fruits and vegetables
- Fresh fruit juices, lemonade, skim milk, and butter milk.

Health Sector

Health functionaries, especially pediatricians, have a pivotal role to play in obesity prevention programs.

- **Childhood obesity** must be **recognized as a "medical condition"** by healthcare.
- Criteria should be developed to **alert patients and health care professionals** regarding consequences of excess weight.
- At present, the US/CDC definitions and IOTF definitions for overweight and obesity are used by researchers and practitioners in India. However, in view of the fact that the body composition of Indians is different from the western counterparts, i.e. there is more body fat in Indians with the same BMI as Caucasians, it is important to develop cut off points for overweight and obesity in children for different age groups in India.
- **Medical schools need to impart training** in screening, management and prevention of obesity and associated health problems.
- **Screening of** children must be organized to ensure preventive action.

- **Counseling all pediatric patients regarding** regular physical activity, reduced sedentary behavior, and healthy eating habits should be standard protocol by clinicians.
- Medical practitioners should advice pregnant women and lactating mothers about the benefits of breast feeding.

Food Industry

- Food and beverage industries should develop products and packaging innovations that address total calorie content, energy density, nutrient density, and standard serving sizes to help consumers make healthy food choices.
- Food outlets must reduce portion sizes to help reduce high calorie consumption. Fast foods and full service restaurants should design healthier meals, food and beverage options (including children's meals) and provide calorie content and general nutrition information at the point of purchase. Options of different serving portions should be offered such as large, medium, and small.
- Industry should also explore the possibilities of modifying product packages – multi packages with small individual servings.

State Governments

The Government should help local community-based organizations to support partnerships and networks that expand the access to healthy foods as well as promote physical activity by providing safe environment.

As a part of the movement to tackle childhood obesity, nationwide awareness campaigns and regular screening of children in schools and health centres especially for obesity should be some of the initiatives.

State Governments should:

- Educate families and initiate public information, education and communication (IEC) activities through booklets, pamphlets, etc.
- Launch media campaigns focusing on messages for good health.
- Fund research and surveys.
- Make physical education compulsory in schools.
- Increase playground facilities and safe play areas for children.
- Encourage cycling. Cycle paths should be developed.

In Brief

- **Children should be screened for overweight and obesity at regular intervals, at least once in a year. If a child is found to develop signs of overweight or obesity, steps should be initiated through counseling on diet and physical activity to prevent further gain in weight.**
- **Balanced diet which has adequate amount of proteins, carbohydrates, fat and vitamins and minerals should be taken by the children.**
- **Daily moderate physical activity of 30 minutes is essential for all children. In addition, 20 minutes of vigorous physical activity three times a week should be encouraged.**
- **Children cannot look after themselves. The stakeholders in promoting good health in children and preventing overweight and obesity are parents, schools, health providers, state governments, food industry, and media.**

Annexure I

Prevalence of Overweight/Obesity and Physical Activity

Category		N	Overweight/ Obese	P value
TV viewing (hrs/day)	None	143	5.6 a b	P < 0.05
	< 3 hrs/day	730	4.9 a b	
	≥ 3hrs/day	335	9.3 b	
Participation in outdoor games (hrs/week)	None	526	8.4 a	P < 0.004
	< 6 hrs	228	6.6 a	
	≥ 6hrs	416	5.1 b	
Participation in HH activities (hours/day)	None	221	18.6 a	P < 0.001
	< 3 hrs	233	4.7 b	
	≥ 3hrs	716	3.9 b	

Source: Laxmaiah A., Prevalence of overweight / obesity and its predictors among urban adolescents in Hyderabad, India: focus areas for sensitization, ILSI-India Conference on Management and Prevention of Child Obesity through Nutritional Strategies and Physical Activity.

Annexure II

WHO Child Growth Standards

Boys

BMI-for-age BOYS 2 to 5 years (percentiles)						
Year: Month	**Months**	**3rd**	**15th**	**Median**	**85th**	**97th**
2: 0	**24**	**13.9**	**14.8**	**16.0**	**17.4**	**18.7**
3: 0	**36**	**13.5**	**14.4**	**15.6**	**17.0**	**18.2**
4: 0	**48**	**13.2**	**14.1**	**15.3**	**16.7**	**18.0**
5: 0	**60**	**13.0**	**13.9**	**15.2**	**16.7**	**18.1**

Girls

BMI-for-age- GIRLS 2 to 5 years (percentiles)						
Year: Month	**Months**	**3rd**	**15th**	**Median**	**85th**	**97th**
2: 0	**24**	**13.5**	**14.4**	**15.7**	**17.2**	**18.5**
3: 0	**36**	**13.2**	**14.1**	**15.4**	**16.9**	**18.2**
4: 0	**48**	**12.9**	**13.9**	**15.3**	**16.8**	**18.3**
5: 0	**60**	**12.8**	**13.8**	**15.3**	**17.0**	**18.6**

Note: If a child aged less than 2 years is measured standing up, change the height to length by adding 0.7 cm BEFORE calculating BMI, because the BMI-for-age for Birth to 2 years is based on length. For children 2 to 5 years measured lying down, convert length to height subtracting 0.7 cm BEFORE calculating BMI for application of the BMI-for-age chart.

Annexure III

Functions of Nutrients and Their Sources

NUTRIENTS	FUNCTIONS	RICH SOURCES
1. PROTEINS	To build and repair body tissues, muscles and vital fluids like blood; to help form enzymes and antibodies to fight infection.	Fresh or dried milk, cheese, curd, curd oilseeds and nuts, soyabean, yeast, pulses, meat lover, fish, egg and cereals.
2. FATS	To serve as a concentrated source of energy and supply fat solvable vitamins.	Butter, ghee, vegetable oils and fat, oilseeds and nuts, fish liver oils and egg yolk.
3. CARBOHYDRATES	To supply energy to the body.	Cereals, millets, roots and tubers, such as potatoes, sweet potatoes, yam, tapioca etc..,and sugar and jaggery.
4. VITAMIN A	To help keep the skin and mucous membranes healthy and to protect against night blindness	Fish liver oils, liver, milk and milk products (curd, butter, ghee) carrots, fruits and green leafy and yellow vegetables.
5. VITAMIN B1 (Thiamine)	For normal appetite and digestion, healthy nervous system, and to help change good carbohydrates into energy for work.	Liver, eggs, pork, legumes, pulses, nuts, oilseeds, fruits yeast, wholegrain cereals and parboiled rice .
6. VITAMIN B 2 (Riboflavin)	To help the cells use oxygen, to keep vision clear and smooth, skin without scaling around and nose or cracking at the corner of the mouth.	Milk, skim milk, curd, cheese, eggs, liver and leafy vegetables.

Contd.

NUTRIENTS	FUNCTIONS	RICH SOURCES
7. NIACIN	To preserve health of the skin, functioning of the stomach and intestines and nervous system	Cereals, whole-grains, meat, liver, yeast, oilseeds, nuts, legumes and pulses.
8. VITAMIN C	To help cement body cells together, strengthen the walls of blood vessels, provide resistance to infection and help in healing.	Amla, guava, citrus fruits, fresh vegetables, salad, and green sprouted pulses.
9. VITAMIN D	To help the body absorb calcium and to help build strong teeth and bones.	Sunlight, butter, cheese, fish liver oil, ghee, egg yolk and milk
10. CALIUM AND PHOSPHORUS	To help build bones and teeth as also the blood to clot and assist muscles and nerves to react normally.	Milk and milk products, leafy vegetables, small fish, cereals, whole-grains, and gingelly seeds
11. IRON	To combine with protein to make haeomoglobin- the red substance in the blood which carries oxygen to the cells.	Liver, yeast eggs, vegetables, oilseed nuts, legumes pulses brown sugar (jaggery), dried fruits and leafy vegetables.

Source: Facts about our diet, Food and Nutrition Board, Ministry of Agriculture & Irrigation, Government of India

Annexure IV

Balanced Diet for Infants, Children and Adolescents

(Number of Portions)

ood groups	g/portion	Infants	Years						
		6-12 months	1-3	4-6	7-9	10 - 12		13 - 18	
						Girls	Boys	Girls	Boy
Cereals & millets	30	1.5	4	7	9	9	11	10	14
Pulses	30	0.5	1	1.5	2	2	2	2	2
Milk (ml)	100	5∀	5	5	5	5	5	5	5
Roots & tubers	100	0.5	0.5	1	1	1	1	1	1
Green leafy vegetables	100	0.25	0.5	0.5	1	1	1	1	1
Other vegetables	100	0.5	0.5	0.5	1	1	1	1	1
Fruits	100	1	1	1	1	1	1	1	1
Sugar	5	5	5	6	6	6	7	6	7
Fats/oils (visible)	5	2	4	5	5	5	5	5	5

∀ Quality indicates top milk. For breastfed infants, 200 ml top milk is required.
One portion of pulse may be exchanged with one portion 950 G) of egg/meat/chicken/fish.
For infants introduce egg/meat/chicken/fish around 9 months.
Specific recommendations as compared to a sedentary woman:

Children:

1-6 years - 1/2 to 3/4 the amount of cereals, pulses and vegetables and extra cup of milk.
7-12 years - Extra cup of milk
Adolescent girls - Extra cup of milk
Adolescent boys - Diet of sedentary man with extra cup of milk

Source: Food Based Dietary Guidelines, Indian Council of Medical Research

Annexure V

Recommended Dietary Allowances for Children

Group	Particulars	Body Wt kg	Net energy Kcal/d	Protein g/d	Fat g/d	Calcium Mg/d	Iron Mg/d	Vit.A.µg/d		Thiamin mg/d	Riboflavin mg/	Nicotidoxi mg/	Pyridoxin mg/d	Ascor Acid mg/	Folic Acid µg/d	Vit B-12 µg/d
								Retinol	min b-carotene							
Infants	0-6 months	5.4	108/kg	2.05/kg		500		350	1200	55µg g/kg	65µg /kg	710µg /kg	0.1	25	25	0.2
	6-12 months	8.6	98/kg	1.65/kg						50µg g/kg	60µg /kg	650µg /kg	0.4			
Children	1-3 years	12.2	1240	22		400	12	400		0.6	0.7	8	0.9	40	30	
	4-6 years	19.0	1690	30	25		18	400	1600	0.9	1.0	11	1.6		40	0.2-1.0
	7-9 years	26.9	1950	41			26	600	2400	1.0	1.2	13			60	
Boys	10-12years	35.4	2190	54	22	600	34	600	2400	1.1	1.3	15	1.6	40	70	0.2-1.0
Girls	10-12years	31.5	1970	57			19			1.0	1.2	13				
Boys	13-15years	47.8	2450	70	22	600	41	600	2400	1.2	1.5	16	2.0	40	100	0.2-1.0
Girls	13-15years	46.7	2060	65			28			1.0	1.2	14				
Boys	16-18years	57.1	2640	78	22	500	50	600	2400	1.3	1.6	17		40	100	0.2-1.0
Girls	16-18years	49.9	2060	63			30			1.0	1.2	14	2.0			

Source: National Institute of Nutrition, Indian Council of Medical Research; Nutritive Value of Indian Foods

Nutrient Contents of Select Food Preparations for One Serving

Recipes	Energy (kcals)	Protein (g)	Carboh hydrates	Fat (mg)	Calcium (mg)	Vit. A(∝g)	Iron (mg)	Thia-mine (mg)	Ribofla-vin (mg)	Niacin (mg)	Ascor-bicAcid	Size of Seving
Tomato and Cheese Toasted Sandwich	353	11.75	32.77	19.37	232.30	184.50	2.17	0.19	0.03	1.70	13.50	2 Sand-wiches
Boiled Egg	87	6.65	-	6.65	30.00	255.00	1.05	0.05	0.20	0.05	-	1 Egg
Clear Tomato Soup	124	2.92	15.46	5.57	122.82	281.85	1.78	0.28	0.13	1.20	56.80	1 Bowl
Chapaties	273	9.68	55.52	1.36	38.40	5.60	3.92	0.39	0.14	3.44	-	4 Cha paties
Rava Idli	376	11.32	43.56	17.41	133.25	24.60	1.33	0.23	0.15	3.86	0.75	4 Idlis
Mixed Dal	180	6.64	18.61	8.78	47.99	24.00	1.76	0.13	0.06	0.66	1.40	1 Bowl
Aloo Gobhi Sabji	178	2.62	14.10	12.33	28.10	35.60	1.10	0.08	0.07	0.90	47.70	1 Bowl
Pea Paneer Curry	363	11.35	19.25	26.70	297.45	88.25	1.37	0.23	0.04	0.80	23.50	1 Bowl
Tandoori Chicken	245	40.74	4.83	7.01	128.38	15.50	0.25	0.04	0.29	0.14	6.60	1 Quater
Mixed Vegetable Salad with Curd Dressing	100	4.80	12.04	3.36	96.70	194.30	1.39	0.16	0.09	0.67	13.00	1 Bowl
Tomato Onion Raita	86	3.88	8.32	4.12	184.61	66.20	0.67	0.13	0.19	0.40	15.65	1 Bowl
Baked Custard	247	11.47	21.51	12.80	211.80	333.00	1.37	0.13	0.49	0.20	3.00	1 Bowl
Vanilla Ice Cream	422	4.86	36.89	26.16	183.94	78.00	0.43	0.08	0.29	0.18	3.74	1 Cup
Gulab Jamun	335	5.85	79.26	10.48	226.58	0.50	2.26	0.01	0.01	0.20	-	2 Pieces
Mathri	166	2.75	18.48	8.97	5.75	7.13	0.68	0.03	0.02	0.60	-	2 Mathris
Cheese Patties	341	6.25	21.55	25.50	132.87	51.98	0.77	0.04	0.03	0.66	2.85	1 Piece
Black Forest Pastry	199	4.82	24.46	8.48	29.68	128.25	1.23	0.04	0.12	0.34	0.44	1 Piece
Sweet and Salty Biscuits	125	1.84	13.90	6.90	5.17	67.67	0.49	0.02	0.01	0.40	-	3Biscuits
Baked Fish	151	14.05	5.74	7.94	580.11	36.50	2.07	0.06	0.06	0.19	13.25	1 Pieces

Source: The Art & Science of Cooking, Institute of Home Economics, University of Delhi

Annexure VII

General Physical Activities Defined by Level of Intensity

The following is modified from the CDC and ACSM guidelines for all ages.

Light Activity+ Less than 3.0 METs* (less than 3.5 kcal/min)	Moderate Activity+ 3.0 to 6.0 METs* (3.5 to 7 kcal/min)	Vigorous Activity+ Greater than 6.0 METs* (more than 7 kcal/min)
Walking casually, less than 3 miles per hour (mph) Walking in the house or yard Window shopping, strolling and stopping frequently. Casual walking, sauntering, strolling, purposeless wandering	Walking at a moderate or brisk pace of 3 to 4.5 mph on a level surface inside or outside, such as □ Walking to school, work, or to shop; □ Walking to school, work, or to shop; □ Walking for pleasure; □ Walking the dog; or □ Walking as a break from work. Walking downstairs Hiking Roller skating at a leisurely pace Jogging or running	Jogging or running Walking and climbing briskly up a hill or stairs Backpacking Mountain climbing, rock climbing and roller skating
Bicycling less than 5 mph – using very light effort	Bicycling 5 to 9mph, level terrain, or with few hills	Bicycling more than 10 mph or bicycling on steep uphill terrain
Stretching exercises-slow warm-up	Yoga Gymnastics General home exercises, light or moderate effort, getting up and down from the floor	Calisthenics-push-ups, pull-ups, vigorous effort. vigorous effort. Karate, judo, taekwondo, jujitsu, jumping rope
Table tennis for leisure	Table tennis-competitive Tennis-doubles	Tennis-singles
Playing catch-football or cricket Throwing a ball	Basketball-shooting baskets	Most competitive sports Football game Basketball game
Throwing a Frisbee Most competitive sports Bowling Darts, Billiards	Playing Frisbee Juggling Cricket-batting and bowling Badminton	Handball-general or team

Light Activity+ Less than 3.0 METs* (less than 3.5 kcal/min)	Moderate Activity+ 3.0 to 6.0 METs* (3.5 to 7 kcal/min)	Vigorous Activity+ Greater than 6.0 METs* (more than 7 kcal/min)
Swimming-floating	Swimming-recreational Treading water-slowly, moderate effort Diving-springboard or platform	Swimming-steady paced laps Treading water-fast, vigorous effort
Putting groceries away-generally Stocking shelved with food	Putting groceries away-walking and carrying especially large or heavy items	Carrying several heavy bags of groceries at one time up a flight of stairs
Sitting and playing a board game or video game Sitting while reading, writing, coloring, painting, using a computer	Playing on school playground equipment, moving about, swinging, or climbing	Running Skipping Jumping
Gardening and yard work: Pruning, weeding while sitting or kneeling, or slowly walking and seeding a lawn	Gardening and yard work: Raking the lawn, bagging grass or leaves, digging, hoeing, light shoveling (less than 10 lbs per minute), or weeding while standing or bending Planting trees, trimming shrubs and trees, hauling branches, stacking wood	Gardening and yard work: heavy or rapid shoveling (more than 5 kg per minute), digging ditches, or carrying heavy loads
Light housework: dusting, vacuuming, sweeping floors, straightening, making beds, cooking or serving food, washing dishes, folding and away laundry, sewing, or carrying out light bags or trash Most other household tasks done while sitting or standing	Moderate housework: scrubbing the floor or bathtub while on hands and knees, hanging laundry on clothesline, sweeping an outdoor area, cleaning out the garage washing windows, moving light furniture, packing or unpacking boxes, waling and putting household items away, carrying out heavy ags newspapers, and plastics or carrying water or firewood General household task requiring considerable effort	Heavy housework: moving or pushing heavy furniture, carrying household items weighing 10kg or more up a flight or stairs, or putting hoveling coal into a stove, Standing, walking, or walking down a flight of stairs while carrying objects weighing 25 lbs or more

Source: U.S. Department of Health and Human Services, Public health Service, Centers for Disease Control and prevention, National Centre for Chronic Disease prevention and health promotion, Division of Nutrition

and Physical Activity. Promoting physical activity: a guide for community action. Champaign, IL: Human Kinetics, 1999. (Table adapted from Ainsworth BE, Haskell WL, Leon AS, et al. Compendium of physical activities: classification of energy costs of human physical activities. Medicine and Science in sports and Exercise 1993: 25 (1): 71-80.

* The ratio of exercise metabolic rate, One MET is defined as the energy expenditure for sitting quietly, which, for the average adult, approximates 3.5 ml of oxygen uptake per kilogram of body weight per minute (1.2 kcal/min for a 70 kg individual). For example, a 2-MET activity requires two times the metabolic energy expenditure of sitting quietly.

+ For an average person, defined here as 70 kilograms or 154 pounds. The activity intensity levels portrayed in this chart are more applicable to men aged 30 to 50 years and women aged 20 to 40 years. For older individuals, the classification of activity intensity might be higher, for example, what is moderate intensity to a 40-year-old man might be vigorous of a man in his 70s. Intensity is a subjective classification.

Data for this chart were available only for adults, therefore, when children's games are listed, the estimated intensity level is for adults participating in children's activities.

To compute the amount of time needed to accumulate 150 kcal, do the following calculation: 150 kcal divided by the MET level of the activity equals the minutes needed to expend 150 kcal. For example: 150/3 METS = 50 minutes of participation. Generally, activities in the moderate-intensity range require 25-50 minutes to expend a moderate amount of activity, and activities in the vigorous-intensity range would require less than 25 minutes to achieve a moderate amount of activity. Each activity listed is categorized as light, moderate, or vigorous on the basis of current knowledge of the overall level of intensity required for the average to engage in it, taking into account brief period when the level of intensity required for the activity might increase or decrease considerably.

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FOOD Guide PYRAMID

for Young Children

A Daily Guide for 2 - to 6 -Year-Olds

FOOD IS FUN and learning about food is fun, too. Eating foods from the Food Guide Pyramid and being physically active will help you grow healthy and strong.

U.S. Department of Agriculture
Center for Nutrition Policy and Promotion
March 1996
Program Aid 1648

WHAT COUNTS AS ONE SERVING?

GRAIN GROUP
1 slice of bread
½ cup of cooked rice or pasta
½ cup of cooked cereal
1 ounce of ready-to-eat cereal

VEGETABLE GROUP
½ cup of chopped raw or cooked vegetables
1 cup of raw leafy vegetables

FRUIT GROUP
1 piece of fruit or melon wedge
¾ cup of juice
¼ cup of canned fruit
¼ cup of dried fruit

MILK GROUP
1 cup of milk or yogurt
2 ounces of cheese

MEAT GROUP
2 to 3 ounces of cooked lean meat, poultry, or fish

½ cup of cooked dry beans, or
1 egg counts as 1 ounce of lean meat
2 tablespoons of peanut butter count as 1 ounce of meat

FATS AND SWEETS
Limit calories from these.

Four- to 6-year-olds can eat these serving sizes. Offer 2- to 3-year-olds less, except for milk. Two- to 6-year-old children need a total of 2 servings from the milk group each day.

EAT a variety of FOODS AND ENJOY!

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