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Promote healthy diets to reduce the double burden of malnutrition in India

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Introduction

While much of the discourse on nutrition in India focuses on under-nutrition, over-nutrition in the Indian population has been increasing in the past decade and more^{1,2}. Although under-nutrition has declined gradually across the last two decades, poor nutritional status continues to be a significant problem in all age groups, regions and income groups. While under-nutrition and micro-nutrient deficiencies are slow to decline, childhood, adolescent and adult overweight and obesity rates are concurrently increasing Table 1. The phenomenon is greater in, but not limited to urban populations³. Overweight and obesity rates in children and adolescents are reportedly increasing not just among the higher socio-economic groups but also in the lower income groups, where underweight still remains a major concern⁴.

This double burden of malnutrition has a huge impact on health, not only in terms of maternal and child mortality and morbidity related to under-nutrition and infectious diseases but, also in morbidity and mortality from non-communicable diseases such as diabetes, hypertension and heart disease (Fig 1). As seen from data on the leading individual causes of Disability Adjusted Life Years (DALYs) in India, most NCDs have risen in rank since 1990⁵.

Drivers of the double burden of malnutrition- the nutrition transition in India

The nutrition transition describes the shift in dietary patterns, consumption and energy expenditure associated with economic development over time, often in the context of globalization and urbanization. The nutrition transition and associated epidemiological and demographic transitions were once accepted as near-linear, gradual processes⁶. Instead, countries are now experiencing a fast-evolving and more complex nutrition paradigm, and India is no exception. The demographic, socio economic and nutrition transitions that are responsible for the double burden are shown in Fig 2. This change is associated with a shift from a predominance of under-nutrition in populations to higher rates of overweight, obesity and non communicable diseases (NCDs)⁶.

These patterns are applicable to India: biological susceptibility due to under-nutrition; the changing food environment and food intake patterns with easy availability of food stuffs high in energy, salt, sugar and fats, and low in other vital nutrients, including micro-nutrients, rising incomes, urbanization, sedentary lifestyle and rural-to-urban migration⁴. India, with its high burden of maternal under-nutrition⁷ is especially susceptible to the biological risks, since poor nutrition in early childhood leads to a range of metabolic adaptations that support survival of the individual in a nutrient-poor environment⁸. However, when confronted with a high energy, plentiful food environment in later years, these adaptive mechanisms may cause metabolic derangement, and lead to obesity and an increased risk of non-communicable diseases (NCDs). This premise is supported in the analysis of National Family Health Survey (NHFS) data by Dang and Meenakshi³ which shows that, among other factors, healthier mothers, mothers with more years of education, and households in which children were born with a healthy weight are less likely to have an intra-household dual burden of malnutrition.

Policy initiatives designed to address maternal nutrition and health, such as those being implemented by the National Nutrition Mission 2017 are essential to address not only under-nutrition, but future chronic diseases as well. The focus areas of the National Nutrition Mission are the life cycle interventions for better pre-pregnant and maternal care and nutrition, support for exclusive breast-feeding, optimum complementary feeding and other nutrition sensitive

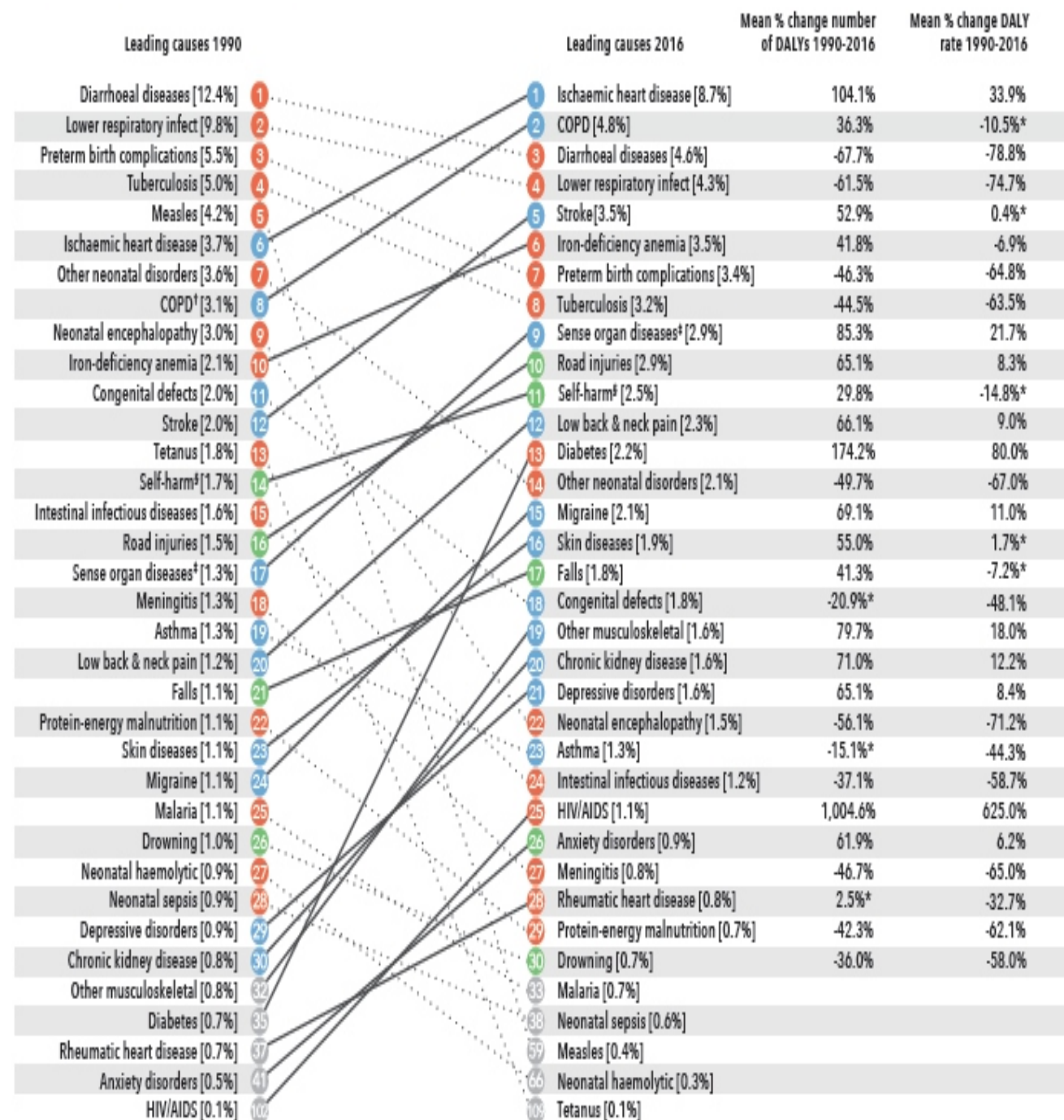
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Fig.1. Burden of Disease in India (Source: Reference No: 5)

Change in DALYs number and rate for the leading individual causes in India from 1990 to 2016

● Communicable, maternal, neonatal, and nutritional diseases ● Non-communicable diseases ● Injuries — same or increase decrease



*Change not significant

The percent figure in bracket next to each cause is DALYs from that cause out of the total DALYs.

[†]COPD is chronic obstructive pulmonary disease.

*Sense organ diseases includes mainly hearing and vision loss.

[†]Self-harm refers to suicide and the nonfatal outcomes of self-harm.

Table 1. Prevalence (%) of childhood obesity (1-18 years) in selected populations in India (Source: Reference No: 4)

Author /study population	City/state	Criteria*	Prevalence of childhood overweight %
Marwaha et al 2006, (5 -18 yrs boys, N= 21,485)	New Delhi	IOTF-Cole	16.8
Raj et al 2007, (5 -16 yrs both sexes, N=24,842)	Kerala	CDC growth charts	4.9
Premnath et al 2010, (5 -16 yrs both sexes, N= 43152)	Mysore, SI	Agarwal Charts	8.5
Khadilkar et al 2011, (2 -17 yrs, both sexes)	Delhi, Chandhigarh,	IOTF –Cole	14.9
	Chennai, Bangalore, other cities	WHO	11.1
Misra et al 2011, (8 -18 years, both sexes, N= 38296)	New Delhi, Jaipur, Agra, Allahabad Mumbai	WHO	18.5
Soorya et al 2014, (6 -11 yrs, both sexes)	Chennai	IOTF-Cole	16.2 (boys) 13.7 (girls)

*definitions of overweight and obesity use various classifications (IOTF- Cole, WHO and CDC)

Table 2 Food policies to support healthy diets

Provide information to improve knowledge, attitudes, skills and behaviour of the population through education, social marketing initiatives	Behavioural changes
Promote food systems that increase availability of healthy agricultural produce	Food system changes
<p>Labelling of foods to encourage healthy dietary choices</p> <p>Decrease portion sizes. Lessen energy density of foods by limiting fat and sugars and reduce salt in pre-packaged processed or ultra -processed foods through product reformulation.</p> <p>Implement the recommendations on marketing of food and non-alcoholic beverages high in fat, sugars and salt to children .</p> <p>Implement fiscal policy measures that increase affordability of healthy foods by providing economic incentives to consume healthy diets and discourage intake of foods high in saturated fats, trans fats, sugars and salt .</p>	Food environment changes
Improve accessibility to healthy foods in public institutions such as schools (e.g. school meal guidelines, cafeteria policies)	

Table 3. NOVA classification of foods (Source: Reference No: 22)

Group 1: Unprocessed (natural) or minimally processed foods: Edible parts of plants or animals, and also fungi, algae which use drying, pasteurization, refrigeration, and vacuum packaging to extend lifetime or, diversify food preparation. These processes do not add salt, sugar, oils or fats. Examples: squeezed or dried fruits, vegetables, meats, seafood; eggs; milk, fruit or vegetable juices pasteurized, powdered or fermented; which may infrequently contain additives to preserve original properties.

Group 2: Processed culinary ingredients: substances obtained directly from group 1 foods or from nature by processes such as pressing, refining, grinding and spray drying. Processing is to make products used in home and restaurants to prepare, season and cook group 1 foods. They are for culinary preparations and rarely consumed alone. Examples: salt; sugar, honey, vegetable oils from crushed seeds; butter and lard. Salted butter, those with added vitamins or minerals such as iodised salt are included.

Group 3: Processed foods: relatively simple products made by adding sugar, oil, salt or other group 2 substances to group 1 foods. Processes include preservation or cooking methods and non-alcoholic fermentation for breads and cheeses. Processing is to increase the durability and to modify or enhance sensory qualities. Examples: canned vegetables, fruits; salted or sugared nuts and seeds; salted, cured, or smoked meats; canned fish; cheeses and unpackaged freshly made breads. May contain additives for preservation.

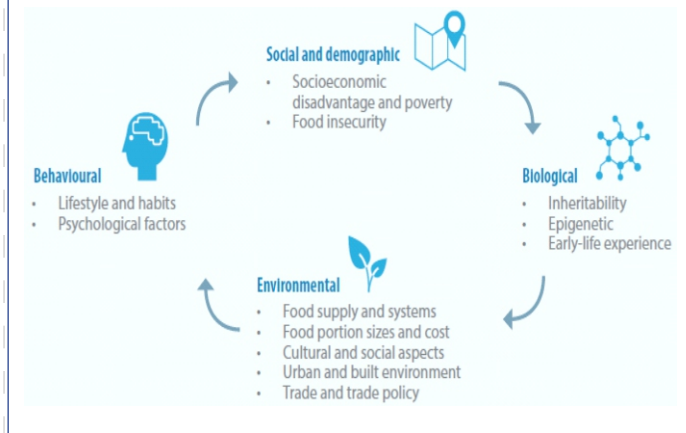
Group 4: Ultra-processed foods and drinks: Industrial formulations typically with five or more ingredients. Often include sugar, oils, fats, salt, and preservatives. Ingredients only found in ultra-processed products include casein, lactose, hydrolysed proteins, soy protein isolate, high fructose corn syrup, and additives (dyes, stabilizers, flavour enhancers, non-sugar sweeteners) whose purpose is to imitate sensory qualities of group 1 foods, or to disguise undesirable sensory qualities of the product. Processing aids such as carbonating, firming, anti-caking agents and emulsifiers are often present. Group 1 foods are often absent. Use of industrial processes such as extrusion and moulding and pre-processing for frying are common. The main purpose of industrial ultra-processing is to create products that are ready to eat, drink or heat, liable to replace both unprocessed and minimally processed foods. They are usually hyper-palatable, with attractive packaging, aggressively marketed, and highly profitable, with branding and ownership by transnational corporations. Examples: carbonated drinks, packaged snacks; confectionery; mass-produced packaged breads; margarines and spreads; biscuits, pastries, cakes; breakfast 'cereals', energy drinks; milk drinks, 'fruit' drinks; meat and chicken extracts and 'instant' sauces; ready to heat products including pre-prepared pies; poultry and fish 'nuggets', sausages, other reconstituted meat products, and powdered 'instant' soups, noodles and desserts.

Table 4. WHO nutrient profile for South East Asia Region (Source: Reference No: 26)

Food Category	Examples of food items ⁱ	Codex Food Category code	Marketing prohibited if thresholds exceed values per 100 g ^a					Energy (kcal) ^m
			Total fat (g)	Saturated fat (g)	Total sugars (g)	Added sugars (g) ^j	Sodium (g)	
1 Confectionery	Cocoa/chocolate bars, spreads, including imitations and chocolate substitutes, hard, soft and chewy candies, chewing gum, Indian sweets, sweet sauces, topping sauces, creamy desserts, sweet desserts, traditional desserts	5.1.1, 5.1.2 (except for products used to prepare chocolate milk or hot chocolate), 5.1.3, 5.1.4, 5.1.5, 5.2, 5.3, 5.4	8.0	No threshold provided	6.0	No threshold provided	No threshold provided	230
2 Fine bakery wares	Cakes, cookies, pies, doughnuts, sweet rolls, muffins, macaroons, biscuits, pancake (ready-to-eat form)	7.2	8.0	No threshold provided	6.0	No threshold provided	0.25	230
3 Bread and ordinary bakery wares	Bread and rolls, pita, naan, rotis, steamed bread, steamed buns, crackers, mixes for making bread and ordinary bakery wares	7.1	8.0	No threshold provided	6.0	No threshold provided	0.25	No threshold provided

ⁱ Few examples are given. Many other products could be included this category. For further clarification, please refer to Annex 3.
^j Refer to Annex 4 for rationale /justification on thresholds.
^k Most thresholds have been rounded up to the nearest half or one decimal where relevant, to allow for minor variations in products.
^l If no threshold is provided for added sugar, but a threshold has been set for total sugar, the sum of both intrinsic sugar and added sugar will be considered as the limiting threshold.
^m Energy threshold not provided for staple foods, beverages and

Fig. 2. Driver of the double burden of malnutrition (Source: Reference No: 6)



support. However, such initiatives will be only partially successful if the food environment that influences diets and other lifestyle factors remains unchanged.

As reported by Meenakshi and Visvanathan⁹, data analyzed from the consumer expenditure surveys of the National Sample Survey Organization (NSSO) for 1993–2004, and 2011–2012 show changes in food consumption patterns at a household level. By 2011–2012 the middle-income population tertile devoted nearly identical shares of their budgets to cereals and meat, eggs and fish of (approximately 13% of income), and fruits and vegetables (8% of income). The dominance of cereals in budget shares decreased across all income groups. There has been a clear increase in the share of energy derived from sugars and oils and other foods. The consumption of oils and sugars rose from 135 to 216 calories per capita per day (pcpd) in the poorest tertile, a much greater increase than the 340–390 calories pcpd seen among the richest tertile. There has been a shift from a traditional high-carbohydrate, low-fat diets towards diets with lower carbohydrates and a higher proportion of saturated fat, sugar and salt. The data validates the premise that a decreasing intake of complex cereals, pulses, fruits and vegetables, and an increasing intake of energy from fats and oils, coupled with declining levels of physical activity are the most likely contributors to the escalating levels of overweight and obesity, dyslipidemia, metabolic syndrome, diabetes mellitus, and ischaemic heart disease seen in the Indian population¹⁰. The prevalence of metabolic syndrome and associated cardiovascular risk factors have been observed not only in urban Indian adults and children but also in economically disadvantaged people residing in low socio-economic areas. This is borne out by data; a similar pattern of diet diversification was found in rural areas as well¹¹. The NSSO estimates of overall fat intakes increased from 31 g pcpd in 1993–1994 to 42 g pcpd in 2011–2012 (NSSO, 2014) in rural India. The NSSO surveys also record a consistent increase in the number of meals (other than school meals) taken outside the home¹¹.

Promoting healthy diets

Global guidelines have been promoting a multi-pronged approach to addressing all forms of malnutrition. More than a decade ago, the WHO Global Strategy on Diet, Physical Activity and Health was adopted in 2004 by the World Health Assembly¹². It called on governments, the WHO, international partners, the private sector and civil society to take action at global, regional and local levels to support healthy diets and physical activity. Since then, many global guidelines and platforms have advocated the importance of addressing malnutrition in all its forms^{13,14}.

Diets should protect against malnutrition in all its forms. Healthy diets are those that promote, protect and support eating practices and lifestyles that are conducive to optimum nutritional and health status in all population groups. The term ‘promoting healthy diets’ is being used increasingly, and often mistakenly understood as focusing only on NCD relevant nutrients in diets - salt, sugar, fat and energy. This is a fallacy since a diversified, healthy diet depends on individual needs (age, gender, lifestyle, degree of physical activity), locally available foods, dietary habits and culture. Nutrition security considerations are also essential; across the entire life cycle, all people should have access to safe and affordable nutritious food. However, basic principles of what constitutes a healthy diet applies to all people and all ages, with added focus on breast-feeding and complementary feeding (for infant and young children)¹⁵. Eating a variety of whole or, minimally processed foods is ideal for obtaining all essential nutrients, as clearly articulated in the Food Based Dietary Guidelines for India¹⁶.

The food environment and policy options

In order to effect improvements in diets, apart from behaviour change communication to improve knowledge and practices with regard to consuming a healthy diet, it is also essential to address the food system and the food environment¹⁷. Improving the macro-environment around diets is important; factors such as falling prices of unhealthy foods, distortions in food prices caused by free trade, and globalization all lead to an increased availability, accessibility and promotion of foods high in energy, salt, sugar and fat¹⁸. Although dietary intake is often seen as an individual responsibility, the food environment markedly influences dietary behaviours and needs to be addressed¹⁹. Over the past decade, there is growing evidence that governments need to take specific actions to promote a healthy food environment¹⁸. The International Congress of Nutrition 2014 drew attention to the importance of considering the whole food system ‘from farm to fork’ in efforts at supporting healthy diets¹³. The NOURISHING framework of the World Cancer Research Organization provides a useful summary of the domains (food environment, food system and behaviour change communication) and action areas to address obesity and describes a comprehensive package of policies to promote healthy diets and reduce obesity and non-communicable diseases²⁰. The WHO has proposed the measures shown in Table 2, which are also reflected in the above framework, and which are based on either economic cost analysis or other evidence, to promote healthy food environments²¹.

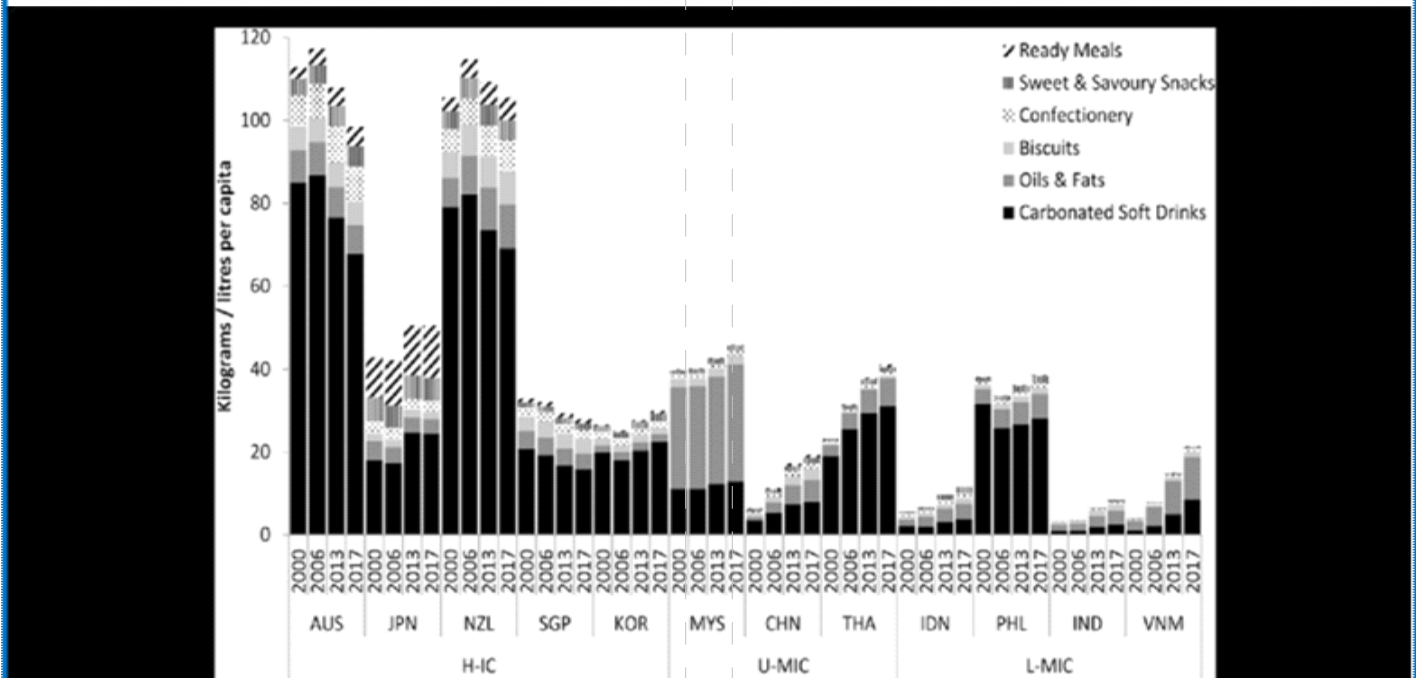
These are all based on policies that aim to foster better dietary behaviours, improve the availability and affordability of and access to healthy diets, and decrease the availability, affordability and acceptability of unhealthy diets. Many of the actions are regulatory, while others are not, but they all need a significant amount of multi-sectoral coordination in order to be implemented successfully.

Table 5 Pan American Health Organization (PAHO) Nutrient Profile Model Criteria

Panel C. PAHONP Model criteria for identifying processed and ultra-processed products excessive in sodium, free sugars, other sweeteners, saturated fat, total fat, and trans fat

Sodium	Free sugars	Other sweeteners	Total fat	Saturated fat	Trans fat
≥ 1 mg of sodium per 1kcal	≥ 10% of total energy from free sugars	Any amount of other sweeteners	≥ 30% of total energy from total fat	≥ 30% of total energy from saturated fat	≥ 1% of total energy from trans fat

Fig.3. Sales of ultra-processed food products and oils and fats in selected Asian markets (2000-2013) with projections to 2017 (Source: Reference No: 34)



The product categories were selected as these have been previously identified as contributing most significantly to sugar, salt and fat consumption from ultra-processed foods in Asia; H-IC = high-income countries; U-MIC = upper-middle income countries; L-MIC = lower-middle income countries Source: Baker and Friel 2016. (<http://creativecommons.org/licenses/by/4.0/>)

Practical difficulties in defining components of less healthy diets

Implementing policies to accomplish the above strategies is quite challenging, since these are comparatively novel areas of work for nutrition stakeholders for example, the objective categorization of foods that are more likely to increase dietary risk of NCDs, i.e. those high in energy, salt, sugar and fats. Another issue that is tied to the same problem is the one relating to processed foods; there is increasing attention to the role of food processing in global food supplies and dietary patterns. However, many inconsistencies arise when defining such foods since even cooking is a way of processing a food. One attempt to define the term 'processed food' is the NOVA classification for foods²² (Table3). NOVA is the food classification that categorises foods according to the extent and purpose of food processing, rather than in terms of nutrients. NOVA classifies all foods and food products into four clearly distinct and meaningful groups.

The implications of industrial food processing methods, (in particular with ingredients developed or created by modern food science and technology) and their influence on dietary patterns and health risks have been understated so far. The prospective cohort study carried out by NutriNet-Santé reported that a 10% increase in the proportion of ultra-processed foods in the diet was associated with a significant increase (greater than 10%) in risks of breast cancer and cancer overall²³. The authors concluded that further studies are needed to understand the relative effect of the various dimensions of processing (nutritional composition, food additives, contact materials, and neoformed contaminants) on the observed increased risk of cancers and consumption of processed food.

Objective classification of foods using nutrient profiling

In the West unhealthy food as are often termed as 'junk food' and 'fast foods'. "Junk food" was originally defined as fast food such as burgers and fries, but has over time been expanded to include fried chicken and carbonated drinks. There is a need for objectively classifying foods as those that may form components of a healthy diet and those that will not be healthy foods. Nutrient profiling is the science of categorizing foods according to their nutritional composition²⁴. The profiling can be based on an algorithm using the nutrient levels in foods (e.g. high fat; low fat; reduced fat; source of fibre; high in fat, sugars or salt/sodium; energy dense, nutrient poor); or address directly the effects of consuming the food on a person's health (e.g. healthy, healthier option, less healthy). One of the most common uses of nutrient profiling has been for food labelling schemes, especially front-of-pack labelling of supplementary nutrition information, and for restricting certain packaged foods from being marketed for consumption by children. The alternative to using nutritional composition to categorise foods is to use non-nutritional features such as their biological characteristics (such as fruit) or their means of production (biscuit or yoghurt), which does not serve the purpose of describing the health-related properties of foods²⁵.

Some degree of nutrient profiling has been used in describing health and nutrition claims, but the criteria for descriptions of foods such as 'low in fat', 'less healthy', may need to be altered depending on the purpose for which they are required²⁵. Systematic and transparent government-led nutrient profiling is essential for regulatory purposes such as those described above.

There are various types of models currently available from which one or more can be selected according to the intended purpose. Simple threshold models provide set thresholds for nutrients of interest, which are common across categories (across-the-board criteria), or varying across different food groups. Table 4 provides a section from the model developed for use by the WHO South East Asia Regional Office which is food category specific²⁶. Its thresholds are based on the WHO Population Nutrient Intake Goals for preventing obesity and related NCDs²⁷ and sugar²⁸ and sodium and sugar guidelines²⁹.

The nutrient profile model of the Pan American Health Organization uses across-the-board criteria to define thresholds³⁰ (Table 5). While this model is simpler, there is less inducement for food producers to reformulate their products within categories.

India too has been provided technical support by WHO in developing nutrient profiling to support healthy diet actions. The nutrient profile model used by India for food labelling and marketing is based on the WHO Nutrient Profile Model for South-East Asia Region.

Policy measures to improve the food environment and their implementation

Major improvements are needed in the health-fulness of food environments if the global diet-related NCD targets, of halting the rise in obesity and type 2 diabetes, are to be met³¹. It is essential that implementation of government-led policies and regulations, such as restrictions on marketing of unhealthy-food targeted to children, interpretive front-of-pack labelling, healthy food policies in schools and the public sector, and taxes on unhealthy products, such as sugar-sweetened beverages, are implemented. Global food production and processing have undergone remarkable transformation and the urban and rural poor are selectively purchasing increasing amounts of processed foods from retailers³². The retail sector has penetrated all cities and most villages in almost all low and middle income countries. In countries such as Brazil, consumption of such foods has reached high levels, and even overtaken some of the other western countries in a relatively short time period³³. An evaluation of early feeding practices and consumption of ultra-processed foods at 6 years of age from a birth cohort study in Brazil showed that 40.3% of total daily energy intake at 6 years came from ultra-processed foods. Transnational food and beverage corporations (TFBCs) are targeting Asian markets attracted by their high economic growth rates, young and growing populations, and increasingly open markets^{34,35} (Fig 3). Multinational companies which are the main producers of such foods, employ aggressive marketing as a key tactic. It is therefore doubly important that policies to implement and protect a healthy food environment are made robust and effective. The Indian food and grocery market is the world's sixth largest, with retail contributing 70 per cent of the sales³⁶. The Indian food processing industry, one of the largest industries in India, accounts for 32 per cent of the country's total food market and is ranked fifth in terms of production, consumption, export and expected growth.

Existing evidence shows that transnational food and beverage manufacturers have, when entering developing country markets, tended to invest in the ultra-processed food categories in particular soft drinks, snack foods and biscuits - the same categories identified as food products with high sugar, salt and fat in countries across Asia³⁴. A systematic assessment of different dietary patterns across 187 nations in 1990 and 2010 analysed by Imamura et al showed that, India (following the pattern for many South Asian countries) ranked 70th of 187 countries for the overall diet pattern (50.6 points, 95% UI 45.5–56.0), ranked high (23rd) for the score based on fewer

unhealthy items (70.0, 63.0–77.0) but ranked low (149th) for the score based on more healthy items (33.8, 27.4–40.4)³⁷. Evidence is building up that more unhealthy diet consumption maybe increasing across India. A Dietary And Lifestyle (DAL) survey conducted among secondary school students attending private schools in the Kolkata metropolitan area, showed that among 14-16 years old children, among the nine food groups (excluding water) assessed, energy-dense snacks was the most commonly consumed food group³⁸. This group over-consumed energy-dense, nutrient-poor foods and did not consume adequate amount of vegetables, pulses and animal foods. Thus it is appropriate time that India's policymakers take concrete actions to address the problem, even though ultra-processed food consumption is not as high as in Western countries.

In countries such as India, which bear a significant double burden of malnutrition, any changes proposed to address overweight and obesity should ensure that under-nutrition in key nutrients is not exacerbated. Similarly, interventions for micro-nutrient deficiencies should not lead to excess intakes of saturated fats, trans fats, sugars and salt, which increase the risk of obesity and NCDs. Where under-nutrition linked to poor growth persists, the best choices for meeting energy needs are nutrient-rich, fresh/minimally processed foods and not pre-packaged, processed or ultra-processed foods, which may meet energy needs, but provide little in terms of essential nutrients and are high in saturated fats, trans fats, sugars and sodium. Thus, a logical, evidence-informed approach to selecting, developing, implementing and monitoring population-based interventions should be followed, especially within the context of the double-burden of malnutrition in South-East Asia. Implicit is the understanding that natural or minimally processed foods are best and their consumption should be encouraged wherever possible.

The informal sector which contributes to a significant percentage of the daily diets of people, especially urban populations, is another area that needs attention³⁹. Many of the foods sold in such settings are also high in salt, sugar and fats and low in micro-nutrients. This is an area that provides an important opportunity to more fully address healthy diets⁴⁰. In addition to contributing to higher energy and nutrient intakes, foods from the informal sector may also carry higher food safety and health risks, as these foods are not subjected to the same rigorous standards required for the formal packaged food sector. The implications for policy and consumer engagement are not yet clear, but they must be considered. Obviously, a huge responsibility lies in educating the public, who should demand healthier foods.

Conclusion

Interventions are likely to be most effective when used in a coherent, integrated way to address underlying drivers and barriers to a healthy diet. Effective action in tackling nutrition challenges needs to be carefully measured and evaluated, and best practices scaled up, so that policy-makers take informed decisions. Since diet is shown to be a highly significant factor associated with disease, a culturally-grounded comprehensive approach to promoting healthy diets is essential.

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FOUNDATION NEWS

- The Annual Foundation Day of Nutrition Foundation of India will be celebrated on 26th November 2018. Dr Mahtab S. Bamji will deliver the C. Ramchandran Memorial Lecture on 26th November 2018 at 3 PM at Nutrition Foundation of India, New Delhi.
- In association with NAMS, NFI will conduct a one-day symposium on 27th November 2018 at the Kamla Raheja Auditorium, NAMS House, New Delhi. Eminent speakers are being invited to present various topics.

NUTRITION NEWS

- The Golden Jubilee Conference of the Nutrition Society of India will be held at the National Institute of Nutrition, Hyderabad, between 15th and 17th of November, 2018.