

# Increasing Fruit and Vegetable Consumption: Challenges and Opportunities

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## Introduction

Non-communicable diseases (NCD), including cardiovascular diseases (CVDs), diabetes, cancers and chronic respiratory diseases, accounted for at least 50% of all deaths worldwide in 2005 and projected to increase to more than 60% by 2015 with major brunt being borne by low and developing countries.<sup>(1)</sup> In terms of attributable deaths, the leading NCD risk factor globally are raised blood pressure (to which 13% of global deaths are attributed), followed by tobacco use (9%), high blood glucose (6%), physical inactivity (6%), and overweight and obesity (5%).<sup>(2)</sup> In addition to causing premature deaths, these diseases cause complications and disabilities, limit productivity, decreases quality of life, require costly treatments with implicit social burden and adverse health financing outcome for individual, family and country.

## Background

Fruits and vegetables (F AND V) provide a diversified, flavored, colorful, tasty, low caloric, and protective, micro-nutrient rich diet. Overall it is estimated that low F AND V intake is attributable to approximately 2.7 million (4.9%) annual deaths and 26.7 million (1.8%) DALYs and causes about 31% of ischaemic heart diseases (IHD), 11% of stroke and 19% of gastro-intestinal cancers and still significantly associated (protective) with lung/pharyngeal/laryngeal/oral cancer, type-2 diabetes mellitus, bone-health, vision/cataract and micronutrient deficiency state. Low F AND V intake is

considered as the sixth main risk factor for mortality in the world.<sup>(3-5)</sup>

The Lyon Diet Heart Study demonstrated that a 'Mediterranean diet' (which is high in F AND V) substantially reduced the risk of incidence and mortality from myocardial infarction (MI) when compared with low fat diet alone.<sup>(6)</sup> The results of Indian Experiment of Infarct Survival (IEIS) showed that consumption of low-fat diet enriched with F AND V, compared with a standard low-fat diet, was associated with about 40% reduction in cardiac events and 45% reduction in mortality after one-year.<sup>(7)</sup> A study carried out in south India too observed higher F AND V intake explained 48% of protective effect against CVD risk factors in the studied population.<sup>(8)</sup> While results from the Dietary Approaches to Stop Hypertension (DASH) trial suggested that changes in dietary fats do not necessarily accompany automatic increase in F AND V intake.<sup>(9)</sup>

## Global Consumption of Fruits and Vegetables

Globally, majority of people consistently are consuming less than the daily recommended F AND V requirement. Even in developed nations e.g., Australia, Canada, Europe, UK and USA, researchers have concluded that there is large gap between actual and recommended consumption of both F AND V despite decades of concern and publicity while resultant outcomes were short-lived. In a study from 52 low and middle-income countries 77.6% of men and 78.4% of women consumed less than the minimum recommended servings of F AND V. Same study reported 74% low F AND V consumption amongst adults in India.<sup>(10)</sup>

Let's analyze the situation in USA for better appreciating the challenges and need for early action. In 1991, about 8% of individuals reported being aware that F AND

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V intake should be at least five servings a day and this proportion had increased to 40% in 2004. But this heightened awareness did not translate into behavior change as trends in consumption showed that intake of fruit had not changed and intake of vegetables had decreased slightly during the same period.<sup>(11,12)</sup> A review from the National Health and Nutrition Examination Study (NHANES) found that only 0.9% of adolescents, 2.2% of adult men, and 3.5% of adult women met their dietary guidelines for both F AND V.<sup>(13)</sup> Nearly third of US children are overweight/obese. Further, it is not surprising that 8 states that have the lowest F AND V consumption are also among top 10 highest obesity ranking states. Similarly, Behavioral Risk Factor Surveillance System (BRFSS), found that only 32.5% of adults ate fruit two or more times daily and only 26.3% ate vegetables three or more times a day.<sup>(14)</sup>

### Consumption of Fruits and Vegetables in India

Traditionally, Indian life style has a predilection for fresh F AND V or those processed at home. On the contrary, surveys indicate a consistently low consumption of F AND V. Avg. household consumption of F AND V indicate 149 (fruits: 20) to 152 (fruits: 27) during this decade though far below the recommended intake but slightly better from the previous survey (120-140 g/capita/day).<sup>(15-17)</sup> Annual consumption (kg/person/annum) of fruits was 9.6 (rural), 15.6 (urban) and 11.8 (India) while it was 74.3 (rural), 79.1 (urban), 76.1 (India) for vegetables.<sup>(18)</sup> According to latest National Sample Survey Office (NSSO) survey revealed that out of 1000 household in India, vegetable consumption was reported by 983 (rural) and 932 (urban) whereas fruits by 608 (rural) and 777 (urban) residents.<sup>(19)</sup> Other recent studies on avg. consumption of F AND V amongst urban residents of Chennai and Jaipur reported as 265 gm/day and less than 3 servings by 72.6% respondents respectively.<sup>(20,21)</sup>

Non-communicable disease (NCD) risk factor survey carried out in seven states using WHO 'STEP' approach under integrated disease surveillance project (IDSP) showed that people consumed vegetables four to seven days and fruits two to three days in a 'week'. Fruit consumption was higher in urban areas but no difference was noticed in vegetable consumption across rural-urban divide. The proportion of respondents eating less than five servings of F AND V ranged from 76% (Maharashtra) to 99% in Tamil Nadu.<sup>(22)</sup> Similar low consumption has been highlighted in NFHS-3 survey that rises significantly with wealth status. 'Weekly' consumption of fruit increases from 16% in the lowest to 72% in the highest wealth quintile. At one end of spectrum, micronutrient deficiency state is wide-spread e.g. more than 70% children, 55%

adult women and 24% men having some form of anaemia. While at other end, this survey on the basis of body mass index (BMI) also highlighted that 13% of women and 9% of men are overweight/obese in country with at least 20% of women being overweight/obese in Punjab, Delhi, Goa, Kerala and Tamil Nadu.

### Recommended Intake of Fruits and Vegetables

The general recommendation for intake of F AND V is atleast 400 grams per person per day (five serving of 80 g each day) or about 146 kg per person per year.<sup>(23,24)</sup> Similarly, national nutrition guidelines recommends avg. daily consumption of 300 g for vegetables (portion size = 100 gm × no. of portions = 3) and 100 g of fruits (portion size = 100 gm × no. of portions = 1). The vegetables include (green leafy vegetables = 50 gm, other vegetables = 200 gm, roots and tubers = 50 gm).<sup>(25)</sup> A glass of fruit juice (excluding sweetened beverages) counts towards a portion of fruit each day although whole fruit is encouraged for its fiber content in-conjunction with active life-style.<sup>(26)</sup>

### Production of Fruits and Vegetables in India

India is second largest producer of F AND V in the world, accounting roughly 10% and 15% respectively, of total global production. Of the available 194 million hectares of land for agriculture (total cropped area) which happens to be the principal source of livelihood for 58% of population, the area under F AND V is about 8%. The production of F AND V crops was 72.3 and 133.5 million tons in the year 2010 with per capita availability of 172 and 318 gm/day respectively. The diverse agro-climatic zone in the country makes it possible to grow almost all varieties of F AND V (be it tropical, semi-temperate, or temperate type) which together constitute about 92.3% of total horticultural production (F AND V, roots, tubers, flowers, aromatic, medicinal plants, spices and plantation crops) in the country. F AND V are typically grown in field conditions; the concept is opposed to cultivation in green houses as practiced in developed countries for high yields.

India leads the world in the production of mango (40%), banana, papaya, sapota (30%) and lime and in productivity of grapes per unit land area. In case of vegetables, potato, tomato, onion, cabbage and cauliflower account for around 60% of the total vegetable production in the country.<sup>(27)</sup> Andhra Pradesh is the largest producer of fruits in India with an estimated share of 16.9% followed by Maharashtra (15.6%), Tamil Nadu (11.1%), Gujarat (8.8%) and Karnataka (8.7%). Other important fruit producing states are Jammu and Kashmir,

Uttarakhand, Uttar Pradesh, Bihar, Jharkhand, West Bengal, Kerala and Madhya Pradesh.

### Challenges: Production to Consumption

There occurs relative shortfall of F AND V in meeting nutritional required need of population not at production but due to mismanagement at subsequent levels. Because of the inherent perishable nature of the produce/short shelf life of these crops, as much as 30-35% of F AND V perishes during harvest, storage, grading, transport, packaging and distribution. Wastage of F AND V due to poor post-harvest management and lack of cold chain facilities have been estimated to cost up to Rs 13,600 crores and 14,100 crores annually. Further on the flip side only 2% of these crops are processed into value-added products such as juices and concentrates, pulp, canned and dehydrated products, jams and jellies, pickles and chutneys while the processing ranges from 80% to 30% in USA, China, South Africa, Brazil, Chile, Philippines, Malaysia, Thailand etc.<sup>(28-30)</sup> It is not surprising to note that wastage is a universal phenomenon. According to FAO, per capita food wasted by consumers in Europe and North-America was 95-115 kg/year, while this figure in Africa and Asia was only 6-11 kg/year.<sup>(31)</sup> In UK, by cost, 35% of the wasted food comprised of F AND V and by weight, it constituted 40%. Australian consumers threw away \$5.3 billion worth of food in 2004, over half of which was fresh food, such as F AND V.<sup>(32)</sup>

F AND V is a labor and risk intensive sector compounded by other weaknesses like farmer ignorance, food security concern, lack of credit with farmers to diversify and allocate large areas of land for horticulture production, non-availability of good quality seeds, impoverished yield, pest/birds/animal menace, poor infrastructure, in-sufficient cold storage space, unreliable transportation, high electricity tariff, taxation and fees structure, massive un-organized sector, under-utilized public private partnership instruments, in-adequate use of technology, poor compliance to safety standards, inadequate quality control, lack of Research and Development, labeling and certification challenges as display of nutritional facts label is mandatory under the law, costly packaging and difficulty in finding buyers.<sup>(33)</sup> These factors could be summed into production, supply chain and market promotion, development and access issues.

At consumer level income, price, access, individual taste preferences, consumer awareness, quality consciousness, decision making power, working status of women, beliefs, cultural values, perception, attitude, traditions, as well as geographical, environmental, and other social factors (preparation, storage and handling of food) all interact in a complex manner to shape dietary consumption patterns of individual and household.

The other possibility could be that till such time the physiological need to satisfy hunger is met, households have little choice but to focus on cheap sources of energy such as grain and starchy staples. This is especially true for people in low and middle income countries. A survey of infant feeding among Asian families residing in England showed that at five months of age, 75% of Pakistani (and White mothers), 63% of Indian mothers and 61% of Bangladeshi mothers were giving fruit juices as source of non milk drink.<sup>(34)</sup> Another UK based study demonstrated that a healthy shopping basket cost around 38% more than unhealthy one.<sup>(35)</sup> Once household have satisfied their basic energy needs, they starts diversifying their diets by including animal source food, dairy products and F AND V, thereby increasing the role of consumer preferences in shaping food consumption pattern and choices.

NSSO report based on 100,794 households revealed that average monthly per capita consumer expenditure (MPCE) for Indian citizen stood at Rs. 1984 (total food: Rs. 881 and non-food items: Rs. 1104) in urban and Rs. 1054 (total food: Rs. 600 and non-food items: Rs. 453) in rural India with share of F and V as Rs 175.2 (urban) and Rs 112.9 (rural) area.<sup>(19)</sup> Thus F AND V constituted 10.7% (rural) and 8.8% (urban) MPCE (2009-10). In comparison from previous NSSO survey it emerges that share of F and V in consumer expenditure (and also consumption) has not improved i.e., 10.7% (1987-88) to 15.7% (2007-08) in rural and from 13.9% to 16.6% in urban India. The report also observed that 39% urban and 7.0% rural house-holds possessed a refrigerator; in-contrast to 99% in USA. Depending on the level of motivation this is another challenge for F AND V consumption. On other hand, widely held belief that the man of the house gets lion's share of the food basket at the expense of the woman was not found to be true, at least in the states surveyed by the NNMB. No gender discrimination was observed in any of the age groups, with respect to intra family food distribution however poor child feeding practice was extensive. Probably efforts, motivation and/or patience were missing in the community.

In the backdrop of accelerated urbanization, environment improvement, opening of food malls, easy availability of packaged foods/drinks, dedicated 24 × 7 food television channels, food magazines, rising disposable income, irregular food habits and life style changes a reflection for countries in economic transition is aiding the path of nutritional and epidemiological transition. Occasional F AND V contamination reports due to insecticide excess/poor sanitation has often lead people to develop cautious attitude in consuming these natural foods. Last but not the least, market forces are capturing young minds and tongue with junk food using multi-media strategy as a result F AND V is getting marginalized and ousted from mainstream menu.



## Looking at a Brighter Prospect

Agricultural production, food systems and population health are intimately linked. There are three main sources of growth in crop production- expanding the land area, increasing the frequency at which it is cropped and boosting yields. The budgetary and policy interventions for production enhancement needs to be supplemented by other measures like strengthening and developing system for increased absorption, wastage prevention, processing of F AND V into other value added products under the challenge of technology advancement vs. environmental protection. Government of India through National Horticulture Mission (NHM) has taken up many new initiatives recently in this context with articulation of vision statement, strategy and drafting of future road map which includes but not limited to integration of multiple schemes, area expansion, technical advice to farmers/cooperative, setting up nurseries and tissue culture units for production and distribution of quality planting material, precision/organic farming, rejuvenation of old orchards, creation of water sources, minimum support price, financial assistance, air freight subsidy, market infrastructure development, handling system, cold storage, long distance mobile units, pack houses, establishment of ripening and vapor heat treatment facilities, integrated cargo handling, development of mega food parks, accreditation of quality testing labs, 24 × 7 helpline, technology promotion and dissemination, development of data bases and live market information, etc.<sup>(26,36,37)</sup>

The results will be evident over-time but a matter of concern is the slow and tardy pace of implementation of schemes and poor monitoring. The gaps are compounded by overall pitfalls and threats like issue of poor roads, transportation, inadequate electricity, log-jams, climate variability, inflation, corruption, political (in) stability and governance issue. India has to evolve from viewing food security at the aggregate level to ensuring nutrition-security at the individual level. The scale of revamping required for boosting F AND V in Indian market requires infrastructure, linkages and management more than that brought into vaccine sector. Current policy direction is skewed towards overcoming under-nutrition as has been the requirement but now is the time that it is stirred and shaken for future action also i.e., prevention of chronic NCDs.

International agencies are coordinating and engaging national authorities for developing plan for production, processing, promotion and management. With maturing of Indian media (print/electronic), it is actively engaging audiences through multiple platforms to initiate and maintain diet rich in F AND V. Majority of hospitals in country serve atleast one-fruit on daily

basis in their admitted patient's menu barring medical exclusion. There is simultaneous rising trend of ready to drink and convenient (be it package or natural) fruit juice consumption in urban areas. Dietary advice and counseling is in-built into primary health care approach while role of community and home based gardening to increase F AND V availability at house hold level cannot be undermined but emphasis and efforts on stimulating F AND V consumption has been so to say non-existent. An innovative integrated child development scheme (ICDS) successfully delivered on many fronts but failed to realize its primary outcome in context of nutrition. It can be argued that there are no-takers for generic advice but persistence pays-off in long run with specific quantifiable messages.

Ministry of Health and Family Welfare (MOHFW) operationalized National Programme for Prevention and Control of Diabetes, Cardiovascular Disease and Strokes (NPCDCS) on pilot basis in 2008 and there have been some development but till date continues to be in 'infancy' stage. Probably, its failure and/or learning led to conceptualization and launch in an integrated manner along with cancer control in 100 districts during 2010. We will have to wait and watch to see how it evolves over-time in performance delivery since one of the limitations is non-availability of specialist in difficult areas. Annual health survey (AHS) was conceived during 2005 to monitor RCH indicator at district level and its scope has been enhanced to assess lifestyle trend and risk factors related to NCD also in 9 states starting from the year 2012 by Registrar General of India (RGI). Parliament repealed all previous seven existing law related to food items (including Prevention of Food Adulteration (PFA) act, 1954; Fruit product order, 1955 etc.) and enacted uniform, integrated and comprehensive Food Safety and Standard (FSS) Act, 2006 that came into effect from 2011. Under it, Food Safety and Standards Authority of India (FSSAI) a statutory institution operates under aegis of MOHFW. It is currently framing guidelines on quality and safety of foods to be made available or restricted within and around schools. Interestingly, MOHFW building complex has an outlet that offers fresh fruits and juices to visitors on nominal payment basis.

A dedicated website [healthy-india.org](http://healthy-india.org) has been created for information dissemination. Advocacy, consumer awareness and out-reach activities were started on life style modification, tobacco control, healthy diet, promotion of F AND V however it needs to be up-scaled to enhance visibility. It is a known fact that substantial amount of funds allocated by government of India (GoI) to states as also observed in recent NRHM scam and more so on information education and communication (IEC) component gets siphoned off at multiple levels thus compromising the quality, quantity, scale and reach

of health-messages to community at large. Stringent institutional checks and social audits are required to be established and/or strengthened in this direction.

ICMR has fostered international and local collaboration for establishing institutional and community surveillance for NCDs in country. Various bodies like NIN, NNMB, NFI and research organization are overseeing and monitoring consumption pattern and trend. Large number of health/nutritional teaching and training institutions in country including AYUSH (which now also include Sowa Rigpa) are imparting on-line, certificate, diploma courses, graduate, higher degrees and in-service training. Thus the scope and potential for promoting F AND V are plenty within available resources however these needs to be harnessed and tapped on priority basis.

With ever raging continuing debate of academics vs. physical activity, school health program is underway with focus on health promotion but how much is actually being delivered on instilling positive food habits including F AND V promotion is a matter of evaluation. It would be interesting to undertake a survey to assess knowledge, attitude, consumption pattern, determinants and attempts (if any) undertaken for promotion of F AND V by our key human resource- Anganwadi workers, ASHA, health workers, teachers, medical officers and teaching faculties. Such exercise if undertaken at regular intervals would definitely lead to driving the issue across the minds of pivotal stakeholders resulting in cascade effect.

## Conclusion

India can learn from experiences of various communication campaign initiated across globe for promotion of F AND V such as "5-a day"; just add F AND V in your diet; plant F AND V in your lunch box; love fruit-hate waste and suitably adapt and incorporate in our setting. Innovative strategies for communication at consumer level could include mobile/internet/video-games, toys/cartoon character or play-way based activities; observing national/state/district F AND V day; offering hygienic fruits in meetings/conference/seminars and schools/colleges. In the present circumstances, increasing F AND V consumption and preventing wastage may appear difficult, daunting but also feasible task. With the changing epidemiological profile and legacy of malnutrition, promotion of F AND V consumption as a public health issue needs urgent attention. The NCD epidemic is inevitable and approaching fast therefore it is prudent to target sustained intervention to make an impact, early the better. In this context, medical colleges through department of Community Medicine can initiate and sustain NCD risk factor surveillance including F AND V

consumption pattern amongst students, employees and population covered through outreach centres depending upon level of available resources. To conclude, all said and done still the greatest challenge across the globe is to translate knowledge into sustained behavioral action, with no single solution in sight for enhancing consumption. On a positive note, let's make a humble beginning by introspecting our consumption pattern and ensuring every opportunity for communicating and eating seasonal F AND V using daily checklist!

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