



Protein Foods and Nutrition Development Association of India



ULTRAPROCESSED FOODS – A CRITICAL REVIEW OF THE SCIENTIFIC BASIS IN REGULATORY FRAMEWORK

Ultraprocessed Foods - A critical review of the scientific basis in regulatory framework

Dr Sanjog Surve

Dr Prabodh Halde

Dr Joseph Lewis

Dr Jagadish Pai

Dr Malathy Venkatesan



PROTEIN FOODS AND NUTRITION DEVELOPMENT
ASSOCIATION OF INDIA

May 2025

Correspondence Address:

Dr Shashank Bhalkar

Executive Director, PFNDAI

211, Mahalaxmi Chambers,

22 Bhulabhai Desai Road

Mumbai 400026, INDIA

Email: executivedirector@pfndai.org

Phone: +917738852711

Ultraprocessed Foods - A critical review of the scientific basis in regulatory framework

PREFACE

We strongly support India's aspiration to be Viksit Bharat and concomitantly the ambitions to achieve its Food Processing goals. As a stakeholder in this goal and representative of the Food Industry we would like to draw attention to and provide our perspectives on a crucial topic which can facilitate food industry's ability to invest capital and implement innovations, if addressed in a timely manner.

Ultraprocessed Foods (UPF) as a topic, has received global attention and a flood of responses from various quarters, given the nature of its impact on the Food ecosystem.

Under the modern risk-based regulatory framework (FSSA, 2006), the Food Authority is required to provide scientific advice and technical support to the Central Government in matters of framing policies and rules in areas that have a direct or indirect bearing on food safety and nutrition. In doing so, it collects, analyses, and summarises the relevant and technical data, particularly relating to food consumption and forwards messages on the health and nutritional risks of food to the Central Government and others.

Dietary patterns are defined as the quantities, proportions, variety, or combinations of different foods and beverages in diets, along with the frequency with which they are habitually consumed (WHO). While this overview pertains to a specific group of foods, its ultimate purpose is to establish the context for risk-based decision-making - a process required under food law. The focus is on the clarity of the science and the evidence of domestic food consumption patterns from all food sources that contribute to dietary risk factors.

Dr Shashank Bhalkar

INTRODUCTION

The level of Packaged Foods consumption reflects a society's preference for higher value economic activities over home cooking. On the other hand, home cooking is considered, but not proven, to offer incremental health benefits through better control over food composition and therefore has the potential to reduce Disability Adjusted Life Years.

At first glance, the two approaches appear to be exclusive in their means but gravitate towards similar ends, favouring economic output. Hence, most societies create an equilibrium in the proportion of packaged foods versus home cooking, in conjunction with their cultural traditions and economic ambitions. Yes, habits die hard (or slowly), hence the balance and the equilibrium keep shifting. Policymakers play a definitive role in determining the equilibrium, probably based on the utilitarian concept of the greater good for its masses, in line with the science of the day.

Today, Noncommunicable Chronic Diseases (NCD) undoubtedly have a grave impact on our society and economy. As we see later, NCD are caused by multiple factors. But caught in the crosswires is a risk factor amongst many, which is described as food, packaged food, processed food or lately as ultraprocessed food (UPF). This risk factor has inadvertently (or purposely?) and arbitrarily been shifted from food intake from all sources to Processed and UPF, with a clean chit to home-cooked and street foods.

The levels of NCD in India, while a key concern, far exceed any simplistic correlation with processed food; needless to mention that the conclusions are drawn on the basis of extrapolated data from Western Diets, which have little or no overlap with Indian diets. A deep look at the data suggests that when it comes to packaged food the is concern if any, has been exaggerated by damaging opinions without sound evidence or substantiation.

In our country, all processed foods mandatorily adhere to the Food Safety and Standards Authority of India (FSSAI). The safety part of processed food is much appreciated, but FSSAI also plays a dominant role in controlling the levels of ingredients or nutrients and additives, based on sound scientific principles. It has been the guiding authority for the food Industry in India. Surprisingly, some have second thoughts and ignore FSSAI's role while suggesting that products licensed by them can be termed as "unhealthy". The term ultraprocessed food (as explained later) includes most of the Processed foods for which product standards are prescribed by FSSAI, which are being made increasingly unpopular based on the fear generated on health grounds. This creates a genuine case to examine the scientific literature related to Ultraprocessed Foods (UPF) and understand the degree of certainty this data lends to arriving at conclusions for decision-making purposes.

1. Ultraprocessed Foods- Scientific logic does not validate inclusion in Indian nutritional guidelines

The topic of Ultraprocessed foods was floated decades ago, it got its first prominent attention from the Indian Food Industry in March 2024, when the Indian Dietary Guidelines (1) were published under the aegis of the National Institute of Nutrition (NIN). A new chapter was introduced in the Dietary Guidelines with heavy reliance on the prevailing concept of NOVA classification. The Dietary Guidelines of India define UPF as “food and beverage products that have undergone **extensive industrial** processing and contain a **high number** of additives such as preservatives, sweeteners, colourings, flavourings, emulsifiers, and other substances that are not commonly used in culinary preparations”. It should be noted that this definition ignores the nutrient composition and embraces vagueness through inexplicit terms like “extensive” and “high number”.

There was a great curiosity amongst the Indian Food Industry to understand UPFs relevance and applicability from an Indian dietary perspective. However, there were no Indian corroborative studies nor supporting references provided in the Dietary Guidelines to explain the narrative, nor were stakeholders engaged before the release of the document, in contrast with a well-established process exemplified in the US Dietary Guidelines (see US process of preparation for Dietary Guidelines) (2). The same could have been followed.

The UPF concepts from Indian Guidelines were subsequently followed through by the Economic Survey of India 2025 (ESI 2025) presented before the Budget of India 2025. Relying on the need for scientific substantiation of an emerging policy concern, the survey chapter was supported by about 26 references, which merits evaluation of their relevance and domestic applicability.

We decided to study the same and followed up with literature references on some related critical questions. Our findings are summarised below in point 1 and followed by relevant critical questions.

1. Evidence in ESI2025 is inconclusive and exploratory

a) The document ESI2025 does not provide a single reference based on scientific principles that leads to conclusive evidence to establish the role of UPF in NCD.

The research references mentioned therein measure and demonstrate correlation, which at best is an indicative rather than conclusive statistical parameter.

- b) Of the 20 scientific references in the ESI2025, that are based on experimentation or data analyses, most have mentioned the incompleteness of their work and the need to conduct more research. The primary reason was that the studies were not randomised controlled trials but instead observational studies.
- c) None of the references included a study on Indian food consumption vs NCD. This is surprising since, despite the concept of UPF being floated at the turn of the century, we did not find a study from India worth referring to, yet we are amongst the first to include UPF in our dietary guidelines.
- d) None of the referenced studies has established a causal mechanism; interestingly, several papers conspicuously point out this feature explicitly.
- e) Many papers are critical of the NOVA classification and point out the lacunae and its ambiguous nature. (see Annexure 1 for phrases from the articles quoted in the Economic Survey of India 2025)

To summarise our opinion, the critical observations, cautions and recommendations made in the articles must be factored in and accounted for, while making any regulatory decisions or guidelines. It should be noted that the exception statements which occur in the references are not isolated or sporadic. There is a consistent mention because, the cautionary statements are mandatory, as a part of scientific process it is necessary to communicate to the reader when the authors know that conclusions may not have the tenacity or rigor and the observations may have limitations because of their authenticity, bias, completeness or reproducibility. This prevents the reader from being misled.

We therefore urge that in future deliberations, these statements, which invariably suggest that the interpretation of UPF link to NCD is incomplete, should be factored and the rationale of the decision making is transparent to all stakeholders. Additionally, we need to supplement/test such conclusions with data to test the hypothesis of the link for Indian Dietary habits, on an urgent basis.

2. Do we have sufficient evidence? US FDA commissioner's testimony related to UPF and Dietary Guidelines

One of the articles referred to in the ESI 2025 emphatically points out that the value of including UPF into dietary guidelines is still a scientific debate (3). It further states that the role of UPF on obesity risk is a question for the 2025 US Dietary Guidelines Advisory Committee. The UK Scientific Advisory Committee on Nutrition and British Nutrition Foundation has concluded that there is insufficient evidence to include UPF within dietary guidelines. But in India, we have already included UPF in our dietary guidelines.

In their testimony the Commissioner, and the Deputy Commissioner for Human Foods, U.S. Food and Drug Administration, Department of Health and Human Services, before the Committee on Health, Education, Labor, and Pensions, United States Senate have opined (4),

“The health impact of ultra-processed foods (UPF) is at the forefront of many current discussions about nutrition. FDA agrees that the clear association between UPF and poor health outcomes is cause for major concern. Foods deemed ultra-processed are usually characterised by industrial processing, the presence of additives such as flavours or colours, and nutrients intended to make them appetising (saturated fat, sodium, and added sugars).

There is still a lot we need to learn about UPF. For example, nutritious foods such as whole grain bread may be considered ultra-processed but are not necessarily associated with negative health outcomes and indeed have shown to be beneficial. Yogurt and tofu are other examples. Additionally, infant formula and some medically necessary foods would also be considered UPF under some definitions, but are absolutely essential, nutritious foods. It is important that we better understand why and how UPF may be negatively impacting health to help inform targeted policies and avoid overly broad and impractical messages for consumers.”

Note that, unlike the Indian Dietary Guidelines, the US definition of UPF is considering conspicuously the role of nutrients.

Regulators worldwide are concerned with associations of dietary risk factors and public health and introduce measures suitable to their dietary patterns of consumption. There is no single solution that fits all diets, nor is there a perfect diet. It is for this reason that the FSSAI requires Authorities to conduct food consumption studies so that typical Indian dietary patterns emerge and a subsequent action becomes more impactful.

3. How much can we depend on correlations? - Road accidents have correlated with UPF

A study was published in European Journal of Nutrition 2024, by Morales *et al* (5) They concluded, that higher UPF consumption is associated with greater risk of neck and oesophageal carcinomas. The proportion of cancer mediated via adiposity was small. They mention that further research is required to investigate other mechanisms that may be at play with a note stating, “if there is indeed any causal effect of UPF consumption on these cancers”.

Additionally, they did an interesting piece of work, which is missing in the earlier literature, they sought for a negative control from the same data set. So, they assessed the possibility of residual confounding using accidental death as a negative control outcome. They report to have found a positive association between UPF consumption and accidental deaths in the negative control outcome analysis.

This is a great example of how correlations are part of hypothesis but not the proof of it. Dependence solely on correlation-based evidence particularly with observational studies that were designed with unrelated objectives can be misleading.

4. Should we depend on correlations? Non-UPF food can also cause NCD

Let us look at one example of a non-UPF food and its role in a leading NCD- Diabetes. Bhavadharini *et al* (6) studied White Rice consumption and its impact on the incidence of Diabetes. Incident diabetes was deemed to have occurred in those who had no diabetes at baseline but subsequently, on follow-up, reported having a diagnosis of diabetes.

Data on 132,373 individuals aged 35-70 years from 21 countries were analysed for White rice consumption (cooked). During a mean follow-up period of 9.5 years, 6,129 individuals without baseline diabetes developed incident diabetes. In the overall cohort, higher intake of white rice was associated with increased risk of diabetes. However, the highest risk was seen in South Asia (India, Bangladesh, Pakistan) followed by other regions of the world (which included Southeast Asia, Middle East, South America, North America, Europe, and Africa) while in China there was no significant association.

The authors conclude that higher consumption of white rice is associated with an increased risk of incident diabetes, with the strongest association being observed in South Asia, while in other regions, a modest, nonsignificant association was seen.

This is an interesting example that illustrates several aspects of such epidemiological studies,

- a. The authors in their objective section of the paper mention that previous prospective studies on the association of white rice intake with incident diabetes have shown contradictory results but were conducted in single countries and predominantly in Asia. Suggesting a clear role of sampling in the determining the outcome, hence the need for rigor.
- b. The regional differences in the outcome despite similar intake suggest a multifactorial contribution based on the diet of the region in

consideration. Implying that such studies are at best indicative and cannot be used for decision-making.

c. NOVA classification does not consider cooked rice as an UPF, thus raising doubts about its applicability.

We urge the policymakers that since UPF literature is replete with such studies, volatile findings and unsubstantiated inferences we need to go beyond scrutiny of current knowledge and undertake a path of relevant data gathering based on sound principles to chart the future course of dealing with NCD effect in India.

Interestingly, the paper by Bhavadharini *et al* also focuses on the consumption levels, akin to a dose response for the effect observed. Many studies have similarly reported higher NCD with higher intake, but they ignore the possibility of establishing a threshold whereby a certain percentage of UPF consumption as a part of the diet, does not have any significant detrimental effect. We discuss the relevance and need for such work in detail in our next section.

5. Has the level and the nature of Processed Food or UPF consumption in India become a serious risk to Health?

The very essence of being Indian is that you take your cuisine wherever you go. As Indians, we do experiments with food and adapt, but our resistance to change is very high. So even if our diet pattern may show a shift from vegetarian to non-vegetarian or from home-cooked to packaged foods, one must focus on the quantum and rate of change of the shift to uncover the significance of the change, particularly on health. The data and databases generated by government agencies are usually robust and serve a critical role in policy making, but the key question is whether they have the right information to make a judgment about processed foods?

To understand India's unique diet patterns, we focused on three important documents published by Government agencies that have relevant details.

- a. The Household consumption and expenditure survey 2022-23 and 2023- 24 reports (7,8) capture standard categories of food and nutrients at the national level. (Expenditure in monetary terms is only an indicator, it is not a direct measure of nutrient intake or health implications, but it is the only available data, and it does make some salient points.)

The share of total household expenditure on food has declined substantially in rural and urban areas and across India and is a marker of significant progress (2023 vs 2012). Food processing at a fundamental level has aided these changes in the composition of household expenditure, which have expanded the markets for perishable items such as fresh fruits, milk & milk products, eggs, fish, and meat, making them more accessible and affordable across all regions of India -HCES 2023

Cereal, Sugar and salt, and Edible oil expenditure has decreased between 2011-12 and 2023-24. During the same period, Processed foods have increased. Since these four are the major contributors of Fat, Sugar and Salt, we looked at their total contribution during the various MPCE surveys and found that the combined total is decreasing and we are now, in 2023-24 at the lowest total of around 17.4% (Rural plus Urban)(Table 1 and 2). Suggesting that there appears to be a shift in the source of consumption from household to packaged foods. This inevitably happens in a developing country, but the overall calorie consumption is not showing an alarming increase to warrant need for regulatory intervention. It should also be noted that the processed food category in the report, includes purchased cooked foods and snacks, which could also include the home-delivered restaurant food, resembling home-cooked and not industrially processed.

Table 1: Expenses on Calorific Foods + Salt +Processed Foods (rural)

Trend in percentage composition of MPCE since 1999-00 Rural						
Item group	% share in total MPCE					
	1999-00	2004 - 5	2009-10	2011-12	2022-23	2023-24
cereal	22.16	17.38	13.71	10.69	4.89	4.97
cereal substitutes	0.07	0.07	0.06	0.06	0.02	0.02
gram	0.13	0.13	0.13	0.14	0.24	0.26
pulses and pulse products	3.81	2.97	3.19	2.76	1.77	1.78
sugar and salt	2.6	2.48	2.34	1.83	0.93	0.89
milk and milk products	8.75	8.17	7.64	8.04	8.33	8.44
vegetables	6.17	5.88	8.29	6.62	5.38	6.03
fruits (fresh)	1.42	1.46	1.93	2.25	2.54	2.66
fruits (dry)	0.3	0.34	0.49	0.58	1.17	1.19
egg, fish and meat	3.32	3.21	4.74	4.79	4.91	4.92
edible oil	3.74	4.44	3.69	3.74	3.59	2.77
spices	2.74	2.21	3.36	3.5	2.98	3.27
beverages, processed food,	4.19	4.38	7.4	7.9	9.62	9.84
food: total	59.4	53.11	56.98	52.9	46.38	47.04
Calorific Foods + Salt + PF	32.69	28.68	27.14	24.16	19.03	18.47

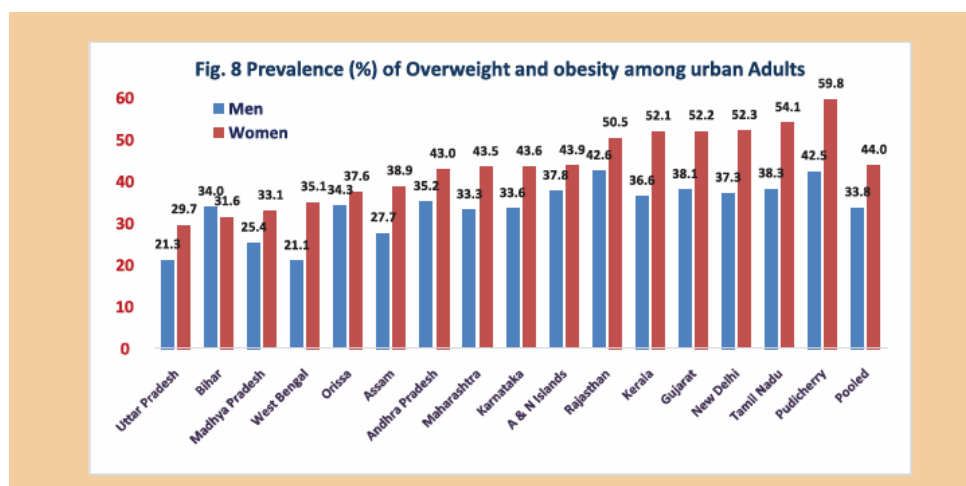
Table 2: Expenses on Calorific Foods + Salt +Processed Foods (urban)

Trend in percentage composition of MPCE since 1999-00: Urban						
Item group	% share in total MPCE					
	1999 - 00	2004 - 5	2009- 10	2011- 12	2022- 23	2023- 24
Cereal	12.35	9.58	8.12	6.61	3.62	3.74
cereal substitutes	0.04	0.05	0.04	0.05	0.02	0.02
Gram	0.11	0.1	0.1	0.11	0.18	0.18
pulses and pulse products'	2.84	2.04	2.37	1.93	1.21	1.22
sugar and salt	1.8	1.57	1.49	1.15	0.6	0.57
milk and milk products	8.68	7.54	6.9	7.01	7.22	7.19
vegetables	5.13	4.24	5.67	4.63	3.8	4.12
fruits (fresh)	1.95	1.68	2.54	2.64	2.5	2.61
fruits (dry)	0.47	0.46	0.63	0.78	1.31	1.26
egg, fish and meat	3.13	2.58	3.63	3.65	3.57	3.56
edible oil	3.14	3.29	2.66	2.66	2.37	1.82
Spices	2.07	1.47	2.21	2.42	2.13	2.3
beverages, processed food,	6.35	5.91	8.03	8.98	10.64	11.09
food: total	48.06	40.51	44.39	42.62	39.17	39.68
Calorific foods + Salt +PF	20.5	17.06	17.64	16.74	14.86	15.4

“PF =Processed food” refers to purchased food items such as jam, pickles, etc., the quantities and values of the individual ingredients of which are not known well enough to be reported against the detailed items listed in the consumer expenditure schedule. All food processed at home is accounted against the ingredients. For example, a sweet prepared at home and consumed is accounted in the household’s (and the concerned State/UTs) consumption of cereals, sugar, milk, etc., but not in its consumption of processed food. Cooked meals and snacks purchased from outside are also considered in this category.

b. What India Eats 2023 (9), which is published by the National Institute of Nutrition, evaluated data from NNMB urban survey data collected from 16 states across 6 regions in India (Urban survey, 2016) and 10 states from 4 regions in rural India (Rural survey, 2012). Amongst other data, it mentions that there was higher intake of other foods such as sweets, ice-creams, carbonated beverages, fried snacks and packaged foods increased the risk of diabetes. It merely refers to the risk factors. There is no data or reasoning provided to substantiate the statement. Thereby preventing an inquiry and understanding of the levels at which these are consumed individually and their contribution to negative health effects if any.

c. The NNMB Report 2017 (10) does not cover processed or packaged food in its survey, it contains only the basic categories of food. It, however, has data on obesity. In one section, it shows very different levels of obesity amongst urban adults based on Gender. There is more than a 10% gap between males and females in obesity level. This gap is startling and unexplained, definitely not explainable by processed food intake levels from any published data (We realise that the NFHS-5 shows the gap reduced substantially.)



Based on the above three reports, it would be hard to determine what food groups or sources, basic foods, packaged foods ready to eat and catering foods play role of diet in obesity or any other disease directly. We do not have enough data about the processed food consumption across the country to assess or determine a correlation with NCD. Most databases have mixed parameters and do not capture a well-defined category of processed food or ultraprocessed food in any way, to the best of our knowledge. Regulated Industry deserves better data and evidence before an unsubstantiated narrative is put forth. An increase in packaged food consumption relates automatically to an increase in NCD is a naive correlation that hurts the reputation of the Food Industry. And as mentioned earlier, most governments are cautious and therefore are in the process of generating data to assess the real reasons for NCD as recommended in much of the scientific literature. It would be prudent if we travel the same path at the earliest.

6. Are alternatives to UPF more nutritious than processed foods?

The other extreme, overconsumption, amongst the overweight, irrespective of price and processing, may not curtail itself with control over processed foods because the root cause lies elsewhere. Thus, the current double burden on the nation, of extremes in weight/ nutrition profiles, if addressed inappropriately, at the cost of suppressing innovative food processing, may begin to look like a triple burden, with the food industry losing trust and being displaced from its responsibility as enabler of nutrition. A recent publication in BMJ captures the development in Chile where their Authorities used all possible means and ways to reduce the consumption of processed foods (11). These included awareness campaigns, taxes, bans, regulatory restrictions, etc.

The result, assessed after 10 years, was that the consumption of Processed food decreased, while the obesity rate (the prime concern) increased steadily. Probable explanation is that the Populace shifted consumption from processed food to alternatives not under government control.

7. How does India fare on risk factors other than Diet when it comes to NCD?

Non-communicable chronic diseases (NCD) represent a significant health challenge globally, characterised by chronic conditions that are not transmissible from person to person. These diseases encompass a wide range of health conditions, including cardiovascular diseases, cancer, chronic respiratory diseases, and diabetes. Unlike communicable diseases, which often spread through pathogens, NCDs typically develop gradually over time and are strongly influenced by various factors such as lifestyle choices, environmental exposures, and genetic predispositions. WHO has identified seven risk factors for NCDs. The three non-modifiable risk factors are Age, Gender, Genetics and the four modifiable risk factors are Diet, Physical Exercise, Tobacco consumption and Alcohol intake.

Literature suggests that Indians have a lot to catch up on all the risk factors

a. Physical Activity is insufficient

Sharma *et al* (12) have also pondered on the question, why obesity is rising in India despite a lower average total calorie intake, as compared to the EAT-Lancet reference diet or even the ICMR recommendations. They suggest that it may be related to the fact that the reference diet is developed for individuals with moderate-to-high levels of activity, whereas available studies estimate high levels of inactivity amongst Indians. A Lancet study looking at trends of insufficient physical activity between 2001 and 2016 suggested that 34% of Indians are not sufficiently engaged in physical activity (13). Similarly, a 2014 ICMR-INDIA study indicates that more than half of all Indians are inactive. Lack of adequate physical activity is found to be more prevalent in urban areas and amongst females (14).

The finding was corroborated by NNMB report 2017, which states that “about two-thirds of the urban men (63%) were working more than 8 hr a day, while three-fourths of women (72%) were working for less than 8 hours a day. And most of them (women) were doing their official work in

sitting posture, at their workplace. On average, more than a fourth of urban men (28%) were doing physical exercise while only 15% women were engaged in exercise”.

Monika Chaudhary and P Sharma report that based on NFHS 5 data, the odds of Sikh women being abdominally obese are higher than those of the Hindu, Jain, or Buddhist women (15). Their thinking is that as the households become wealthier, the women have greater odds of acquiring abdominal obesity. They also report that women consuming non-vegetarian food have higher odds of being abdominally obese. Women belonging to scheduled tribes have lesser odds of acquiring abdominal obesity. The NFHS-5 report provides additional information on the diet patterns found in the country. The report reveals that majority of the Indians (W-71%, M-83%) are now non-vegetarians, who either regularly or occasionally consume egg or meat. About 45.2% of the women and 57.3% of the men consume eggs or meat regularly, either daily or at least once in a week. Studies across the world have demonstrated that meat consumption is associated with abdominal obesity. But again, we need to realize the nature and form of meat consumed in India and elsewhere may be different.

Further Chaudhary and Sharma state that aerated drinks (sugar sweetened drinks), a potential contributor of obesity, is consumed regularly, at least once in a week by 15.5% of women and 24.6% of men in our country. We wonder how much calorific contribution the aerated drinks do at this level on a macro scale. The abdominal obesity levels in adult Indians are far greater and not completely accounted by processed foods in any literature in India.

b. Alcohol and Tobacco consumption are significant contributors to NCD

About 16% of adult men were smoking different products of Tobacco including cigarettes/beedies/cigars and 25% men were addicted to use

smokeless tobacco products, whereas 30% men were consuming alcohol. Most of the users of tobacco and alcohol consumption were found to have these habits for more than 10 years.(16)

c. Air Pollution

Air pollution is a significant environmental concern in India, with elevated levels of ambient PM_{2.5} posing a substantial threat to public health and the economy. Exposure to PM_{2.5} is associated with severe health outcomes, including lung cancer, stroke, and heart disease, contributing to an estimated 1.67 million deaths annually in India. (16)

The concern arises that other commonly shared public health issues are as critical as diet, such as air pollution, drinking water, though less debated and engaging enough. Linking obesity with food intake needs no effort; it is as obvious as obvious can be. There is enough evidence about other factors being in play. Hence, addressing the total mix of risk factors is critical. What if evidence shows that processed foods, as propagated, do not significantly increase the disease burden over other food sources? Is it worthwhile, until evidence becomes available, to cause the Food Industry such distress?

In the next section, we evaluate the consequences of such a step.

8. Can the Indian Economy afford a weakened Food Industry?

It is pertinent, before we conclude, to look at the role of the Food Processing Industry and thereby create an alert against a misguided initiative to tarnish its image.

The agricultural economy of India thrives on value addition by the Food Processing Industry. The entire food output may not end up on industrial land, but it gets the economic benchmark of its fair value from a competitive set up of the Food Industry. It is well known and beyond the scope of this paper to emphasize the commendable employment generated in the entire food supply chain, the food security concerns alleviated by Food Processing technologies and the revenue and goodwill generated by exports. We believe the Indian Government is admirably supporting the Food Processing sector on this front.

Backward integration by the food industry has led to significant improvements in farm yields and reduction in wastage thereby benefiting the farmer and the consumer. These improvements primarily engage the farmer and are at times driven by consumer needs. They are best understood by the food industry.

A significant and highly relevant contribution by the packaged food businesses is that they provide safe nutrition with convenience at an affordable price. This convenience releases the burden of the house-cook in terms of time for other activities, most of which can be and will be devoted to high value work. For India to reap the demographic dividend we must engage more of our masses in the workforce to provide higher value-added goods and services.

The cost and time for preparing dishes at home is high even in countries like France (Marrion Tharry *et al*) (17). Indian food preparations are as elaborate as anywhere else in the world, and the manpower needed for that can be

cumbersome to obtain and then retain. The Time usage study data shows that in India the overall time taken is approximately 2-3 hours per day on cooking and related activities (with significant variation between different regions and household types). While in the Rest of the World (Developed Regions) On average, individuals may spend around 30-60 minutes per day on cooking, with some variation by culture and region. (These figures are approximate and indicative. They reflect how differences in cuisine, convenience, and social structures shape our daily lives.)

Our Advocacy-

We are encouraged by the salutary current initiatives by the government of India. Sharma *et al.* has summarised them adeptly (16).

” The Indian government has undertaken significant measures to combat the growing burden of NCDs by developing and implementing strategic frameworks and programs. One such initiative is the National Multisectoral Action Plan (NMAP) for Prevention and Control of Common NCDs (2017-2022), aimed at reducing exposure to key risk factors associated with NCDs. The NMAP outlines ambitious goals to curb tobacco use, promote physical activity, encourage healthy dietary habits, address harmful alcohol consumption, and mitigate air pollution. Additionally, the government has launched the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases, and Stroke (NPCDCS), focusing on enhancing healthcare infrastructure, workforce capacity, health education, early detection, treatment, and referral services.”

One would be naturally tempted to follow a track parallel to the above initiatives with awareness of food consumption. In doing so, processed foods, being regulated, will be the choicest approach for control and also a sitting target. We recommend that the regulators take a deep look in the matter and weigh in, in favour of leveraging the food processing industry as a partner rather than unleashing initiatives like those in Chile. We have asked Seven Questions above and found areas where the link is very weak to arrive at a forceful judgement against so-called Ultraprocessed Foods. To summarise, the critical points are

- The only open-source document with scientific substantiation in the Indian context, the ESI2025, when reviewed through its references, was found to express ambiguity, incompleteness and tentativeness about the conclusions linking UPF to NCD.
- While several Governments globally have initiated programs against UPF, the leaders in science such as US and UK have

publicly expressed caution against linking NCD with the current definitions of UPF

- The methodology used for linking UPF to NCD, correlations from observational studies failed to stand the test. Even an unrelated parameter - road accidents, has correlated well with UPF
- In adopting the current Indian Dietary Guideline definition of UPF there is a high likelihood of inclusion of some foods which play a positive role in nutritional health of the country and most importantly exclude significant contributor to UPF such as white rice, which is part of the staple diet of the country.
- There is no Indian food or diet **data** which directly implicates the so called Indian UPF with NCD
- Unlike the western countries, Indian even now, leans heavily on home cooked foods with total processed food accounting for about **20% of consumption by value**. There is plethora of alternative food options to processed foods in India which can negate all efforts to curb NCD with processed food Industry as a collateral damage in the process.
- Other risk factors of NCD are growing at an alarming level and their impact needs to be factored in holistically.

We have intentionally not quoted research which shows no correlation of UPF with NCD. There are several such findings published globally. We want to keep the context to India and Indian dietary patterns in this report.

An often-overlooked fact is that processed food has been and can be tailored to deliver specific nutrients to address various health conditions. National Family Health Survey -5 (NFHS-5) shows that almost 33% of our children under 5 years, are in the underweight category, while 13-21% of the adult population has BMI below 18.5. Probably, this segment of our populations is thriving on home cooked food. They can effectively gain support from packaged food, because besides nutritional balancing, these foods can be less expensive, convenient, palatable, hygienic and with higher shelf life.

We need to critically examine the data, its relevance and impact on our society, economically and even health wise before taking stringent actions. The world has taken about 3 decades to build a tentative proposition on the lines of UPF, we must catch up with our data instead of relying on unsubstantiated and non-relevant data that can adversely affect a key driver of economy- the food processing industry

We want to strongly highlight the importance of addressing NCD risk factors through evidence-based interventions and policies tailored to the Indian context. Therefore, prioritising research to identify effective NCD prevention and control interventions is essential. Developing a national research agenda can guide funding allocation and establish research priorities to address the NCD burden effectively (16). Actions implemented by taking the relevant stakeholders into confidence and building consensus will ensure that balance is maintained while we address the difficult NCD challenge.

A sincere request to the regulators to leverage the Food Industry by creating positive impressions about our intent, purpose and products.

ANNEXURE 1

Summary of verbatim statements (with a few paraphrased) from the articles mentioned as References in ESI 2025 document. They display the tentativeness, incompleteness in conclusion and ambiguity in the NOVA classification which is the foundation of UPF. The authors have mentioned this statements so that the reader is not misled and makes appropriate decision to further the science.

Ref. No.	Author	Salient Points	Conclusions
		Overweight/ obesity, Type 2 diabetes	
150	Beslay et al (2020) Ultra-processed food intake in association with BMI change and risk of overweight and obesity: a prospective analysis of the French NutriNet-Santé cohort. PLoS Med. 2020; 17(8): e1003256.	Study limitations include possible selection bias, potential residual confounding due to the observational design, and a possible item misclassification according to the level of processing.	The authors observed that the studied associations may be underestimated due to a lower contrast between extreme quartiles of UPF consumption
151	Levy et al (2021) Ultra-processed food consumption and type 2 diabetes incidence: a prospective cohort study. Clin Nutr. 2021;40(5):3608-14.	Identification of only 0.26% incident T2D cases based on one 24 hour self-reported and nurse interview data in participants of the UK Biobank (2007-2019) aged 40-69 years without diabetes at recruitment.	No clinical evidence of correlation between consumption of UPFs and Type 2 diabetes
152	de Miranda et al (2021) Consumption of ultra-processed foods and noncommunicable disease-related nutrient profile in Portuguese adults and elderly (2015-2016): the UPPER project; Br J Nutr. 2021; 125 (10): 1177-87	After adjustment for socio-demographic covariates, no changes in statistical significance of models have been observed associating inadequate nutrient intake and dietary share of ultra-processed foods	Contradiction regarding elderly was observed. Elderly consumed less UPF and had higher NCD
153	Dickens et al (2024) Ultra-	Obesity, and associations	UK Scientific Advisory

	processed Food and Obesity: What Is the Evidence? Curr Nutr Rep.13,23-38. https://doi.org/10.1007/s13668-024-00517-z	do not appear to be explained by specific UPFs. Ultra-processed salty snacks, sugary products and fruit and vegetables were also not associated with overweight or obesity	Committee on Nutrition and British Nutrition Foundation concluded that there is insufficient evidence to include UPF within dietary guidelines
154	Martini D e t al (2021) Ultra-processed foods and nutritional dietary profile: a meta-analysis of nationally representative samples. Nutrients. 2021;13:3390.	The limited number of articles with data correlating ultra-processed foods and nutritional dietary profile from European or Asian countries strongly limit the generalization of the results to populations.	Further investigation on this matter is needed to confirm the findings provided in the study
155	Poti JM et al (2017) Ultra-processed Food Intake and Obesity: What Really Matters for Health Processing or Nutrient Content? Curr Obes Rep. 2017 Dec;6(4):420-431. doi: 10.1007/s13679-017-0285-4. PMID: 29071481; PMCID: PMC5787353	The lack of specificity of FFQ food item questions may lead to misclassification of ultra-processed foods that could potentially attenuate or bias associations between these foods and health outcomes	There is a clear need for further studies, particularly those using longitudinal designs and with sufficient control for confounding to determine whether ultra-processed food consumption is associated with obesity independent of nutrient content
156	Lane et al (2024) Ultra-processed food exposure and adverse health outcomes: Umbrella review of epidemiological meta-analyses. BMJ, 384, e077310. https://doi.org/10.1136/bmj-2023-077310	Weak to no evidence was found for associations between exposure to ultra-processed foods and hyperglycaemia, metabolic syndrome, non-alcoholic fatty liver disease and overweight and obesity	Evidence for the associations of ultraprocessed food exposure with asthma, gastrointestinal health, some cancers, and intermediate cardio-metabolic risk factors remains limited and warrants further investigation.
		Cancer	
157	Fiolet, T., et.al. (2018)	The authors found no	Results should be

	Consumption of ultra-processed foods and cancer risk: Results from the NutriNet-Santé prospective cohort. BMJ, 360, k322. https://doi.org/10.1136/bmj.k322	significant associations between the proportions of “processed culinary ingredients” or “processed foods” with risk of cancer at any location	confirmed by other large scale, population based observational studies in different populations and setting
159	Cordova, R. et.al (2023) Consumption of ultra-processed foods and risk of multimorbidity of cancer and cardiometabolic diseases: a multinational cohort study; The Lancet Regional Health - Europe, 35	work is a prospective cohort study over a period of 28 years with assessment at 4/4.5 year intervals	Conversely, consumption of ultra-processed breads and cereals was associated with lower risk, although with a borderline certainty, which might be explained by the fibre content of such products
		Gut health/IBD	
158	Whelan, K. (2024) Ultra-processed foods and food additives in gut health and disease. Nat Rev Gastroenterol Hepatol21,406-427(2024). https://doi.org/10.1038/s41575-024-00893-5	Apart from the studies investigating specific nutrients or food components (for example, high-fat diet or high Sugar intake), there is a surprising lack of intervention studies of the effect of UPF on the gut microbiome.	In view of the extremely limited evidence from RCTs of the effect of UPF and food additives in gut disease, in particular on clinical endpoints, it is too early to recommend that patients should follow a diet that restricts these foods
		Mental health	
161	O'Neil A, et.al (2014): PMC9268228. Relationship between diet and mental health in children and adolescents: a systematic review. Am J Public Health. 2014 Oct;104(10): e31-42.doi: 10.2105/AJPH.2014.302110. PMID: 25208008.	The authors acknowledged that the interpretations remain speculative in view of the limited evidence for causality currently available	the relationships observed may possibly be explained by socioeconomic status (which was not considered) or other related variables rather than by diet or mental health alone.
162	Hecht, E et al (2022) Cross-sectional examination of ultra-processed food consumption and adverse mental health symptoms. Public health nutrition, 25(11), 3225-3234.	The study's findings also have limited generalisability to milder forms of depression.	Further research is needed, especially randomised clinical trials

160	Lane MM (2024) Ultra-Processed Food Consumption and Mental Health: A Systematic Review and Meta-Analysis of Observational Studies. <i>Nutrients</i> . 2022 Jun 21;14(13):2568. doi: 10.3390/nu14132568.	Absence of data and limited analytical approaches specifically designed to assess correlation of ultra-processed food consumption to common mental disorders	The field would benefit from the development of tools specifically designed to assess ultra-processed food consumption
163	Ejtahed HS (2024) Association between junk food consumption and mental health problems in adults: a systematic review and meta-analysis. <i>BMC Psychiatry</i> . 24. 10.1186/s12888-024-05889-8.	Evidence for a causal pathway is unclear and needs to be further investigated in well-controlled longitudinal studies	More studies are warranted to assess the mechanisms involved in this relationship to provide scientific support for changes in public health policies
		Tax levy	.
164	Jensen JD (2014) Effects of the Danish saturated fat tax on the demand for meat and dairy products. <i>Public Health Nutr</i> . 2016 Dec;19(17):3085-3094. doi: 10.1017/S1368980015002360.	Danish fat tax on minced beef, sour cream and regular cream products	Given that the average saturated fat intake in Denmark exceeds the recommended level by approximately 40%, the tax seemed to have reduced this gap only to a limited extent.
148	WHO report of 2023 The growth of ultra-processed foods in India: An analysis of trends, issues, and policy recommendations. World Health Organization Country Office for India. https://tinyurl.com/madajds2	1. Portugal (2017) tax on beverages with high sugar 2. Hungary (2011) tax on HFSS food 3. Mexico (2014) Junk food tax	1. After implementation of the tax, a reduction in sales by 7% was seen due to price elasticity and reputational effects. 2. Only 7-16% consumers responded by purchasing a cheaper product which due to lower taxes was "healthier" 3. People purchased 7% less such products that they would have if the tax was not levied according to a survey
170	Arun Gupta (2024) Why there is a Need to Prioritise Regulation of Ultra-	The observations in the	No clinical trials are cited

	processed Foods and HFSS Foods in India? Preventive Medicine RDOI: 10.4103/PMRR.PMRR_59_23 (https://tinyurl.com/34dy7bx).eSearch C Reviews 1(2): p 90-93.	report to emphasize need for regulation of UPF in India are individual opinion based on reference articles with data from other countries.	relating to correlation between consumption and effect of UPF on health in India. Scientific evidence about correlation between UPFs is insufficient
165	WTO (2007) Mexico - Tax measures on soft drinks and other beverages - Status report regarding implementation of the DSB recommendations and rulings in the dispute Mexico - Tax measures on soft drinks and other beverages (WT/DS308/16) https://www.wto.org	Mexico tax dispute: soft drinks using non-cane sugar sweeteners were subject to 20 per cent taxes	The matter was not related to UPF consumption and NCDs
		Advertisements	
169	Kelly, B. et al (2019) Global benchmarking of children's exposure to television advertising of unhealthy foods and beverages across 22 countries. Obesity reviews: an official journal of the International Association for the Study of Obesity, 20 Suppl 2(Suppl2),116-128. https://doi.org/10.1111/obr.12840	Data from India is not available	80% were for supermarkets, where only the store was advertised and not food products, and 14% were for fast food restaurants without products advertised

REFERENCES:

1. Indian Council for Medical Research - National Institute for Nutrition National Dietary Guidelines, [https:// tinyurl.com/bdsdn9w6](https://tinyurl.com/bdsdn9w6)
2. Snetselaar, I.G., de Jesus, J. M., DeSilva, D. M. and Stoody, E. E., (2021), Dietary Guidelines for Americans, 2020–2025. Understanding the Scientific Process, Guidelines, and Key Recommendations; *Nutr Today*; 56(6):287–295, doi, 10.1097/nt.0000000000000512
3. Dicken, S. J. and Batterham, R. L., (2024) Ultra-processed Food and Obesity: What Is the Evidence? *Curr Nutr Rep.*13,23–38. [https:// doi.org/10.1007/s13668-024- 00517 -z](https://doi.org/10.1007/s13668-024-00517-z)
4. <https://www.fda.gov/media/177681/download>
5. Morales-Berstein, F., Biessy, C., Viallon, V., Goncalves-Soares, A., Casagrande C., Hémon, B., Kliemann, N., Cairat, M., Lopez, J.B., Al Nahas, A., Chang, K., Vamos, E., Rauber, F., Levy, R.B., Cunha, D. B., Jakszyn, P., Ferrari, P., Vineis, P., Masala, G., Catalano, A., Sonestedt, A., Borné, Y., Katzke, V., Bajracharya, R., Agnoli, C., Guevara, M., Heath, A., Radoi, L., Mancini, F., Weiderpass, E., Huerta, J. M., Sánchez, M., Tjønneland, M., Kyrø, C., Schulze, M. B., Skeie, G., Lukic, M., Braaten, T., Gunter, M., Millett, C., Agudo, A., Brennan, P., Borges, M.C., Richmond, R.C., Richardson, T. G., Smith, G. D., Relton, C. and Huybrechts, I., (2023), Ultra-processed foods, adiposity and risk of head and neck cancer and oesophageal adenocarcinoma in the European Prospective Investigation into Cancer and Nutrition study: a mediation analysis, *Eur J Nutr.*;63(2):377–396. doi: 10.1007/s00394-023-03270-1
6. Bhavadharini, B., Mohan, V., Dehghan, M., Rangarajan, S., Swaminathan, S., Rosengren, A., Wielgosz, A., Avezum, A., Lopez-Jaramillo, P., Lanas, F., Dans, A. L., Yeates, K., Poirier, P., Chifamba, J., Alhabib, K.F., Mohammadifard, N., Zatonska, K., Khatib, R., Keskinler, M. V., Wei, L., Wang, C., Liu, X., Iqbal, R., Yusuf, R., Wentzel-Viljoen, E., Yusufali, A., Diaz, R., Keat, N. K., Lakshmi, P.V.M., Ismail, N., Gupta, R., Palileo-Villanueva, L. M., Sheridan, P., Mente, A., and Yusuf, S., (2020), White Rice Intake and Incident Diabetes: A Study of 132,373 Participants in 21 Countries, *Diabetes Care* 43, 2643–2650 | <https://doi.org/10.2337/dc19-2335>
7. Survey on Household Consumption Expenditure: 2022-23, Government of India, Ministry of Statistics and Programme Implementation, National Sample Survey Office
https://www.mospi.gov.in/sites/default/files/publication_reports/Report_591_HCES_2022-23New.pdf
8. Survey on Household Consumption Expenditure: 2023-24, Government of India, Ministry of Statistics and Programme Implementation, National Sample Survey Office,
https://www.mospi.gov.in/sites/default/files/publication_reports/HCES%20FactSheet%202023-24.pdf
9. Hemalatha, R., Laxmaiah, A., Sriswan, M. R., Boiroju, N. K., and Radhakrishna, K. V., (2023), What India Eats. Macronutrient intake of different food groups for infant and children, ICMR-NIN, Hyderabad.
10. Diet and nutritional status of urban population in India and prevalence of Obesity, hypertension, diabetes and hyperlipidemia in urban men and women, (2017) national

nutrition monitoring bureau, NNMB Technical Report No.27, ICMR-NIN, Hyderabad.

11. Kolker C., (2024), Chile passed tough measures to combat an obesity epidemic, so why does it still have an obesity problem? *BMJ*, Mar 13:384:q584. doi: 10.1136/bmj.q584.

12. Sharma, M., Kishore, A., Roy D., and Joshi K., (2020), A comparison of the Indian diet with the EAT-Lancet reference diet; *BMC Public Health*, 20:812. <https://doi.org/10.1186/s12889-020-08951-8>

13: Guthold, R., Stevens, G. A., Riley, L. M. and Bull, F. C. (2018), Worldwide trends in insufficient physical activity from 2001 to 2016: a pooled analysis of 358 population based surveys with 1.9 million participants; *Lancet Glob Health*, 6: e1077–86. [http://dx.doi.org/10.1016/S2214-109X\(18\)30357-7](http://dx.doi.org/10.1016/S2214-109X(18)30357-7)

14. Anjana RM, Pradeepa, Das AK, Deepa M, Bhansali A et al (2014), Physical activity and inactivity patterns in India – results from the ICMR-INDIAB study (Phase-1) [ICMR-INDIAB-5]; *International Journal of Behavioral Nutrition and Physical Activity*, 11:26, <http://www.ijbnpa.org/content/11/1/26>

15. Chaudhary, M., and Sharma, P., (2023), Abdominal obesity in India: analysis of the National Family Health Survey-5 (2019–2021) data. *The Lancet Regional Health - Southeast Asia* 2023;14: 100208, <https://doi.org/10.1016/j.lansea.2023.100208>

16. Sharma, M., Gaidhane, A. and Choudhari S. G., (2024), A Comprehensive Review on Trends and Patterns of Non-communicable Disease Risk Factors in India; *Cureus* 16(3): e57027. doi: 10.7759/cureus.57027

17. Tharrry, M., Drogué ,S., Privet, L., Perignon, M., Dubois, C., and Darmon, M., (2020), Industrially processed v. home-prepared dishes: what economic benefit for the consumer? *Public Health Nutrition*: 23(11), 1982–1990, doi:10.1017/S1368980019005081