

## Food Processing and Impact on Nutrition

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**Abstract:** The basic objective of this article is to discuss the effect of food processing on health. Processing (including preparation) makes food healthier, safer, tastier and more shelf-stable. While the benefits are numerous, processing can also be detrimental, affecting the nutritional quality of foods. Blanching, for example, results in leaching losses of vitamins and minerals. Also, milling and extrusion can cause the physical removal of minerals during processing. The findings and conclusion of this paper is that processed food is an important part of our daily life. In spite of its detrimental effects on our health, it is impossible to live without it.

**Keywords:** Food processing, Shelf-life, Nutritional quality of food

### INTRODUCTION

As per ministry of food processing of India (MOSPI), the process of value addition to the agriculture or horticulture product by various methods like grading, sorting and packing is known as 'food Processing'. In other words, it is a technique of manufacturing and preserving food substances in an effective manner with a view to enhance their shelf life; improve quality as well as to make it more useful. It covers a wide range of products from sub-sectors comprising agriculture, horticulture, plantation, animal husbandry and fisheries. The Ministry of Food Processing indicates the following segments within the Food Processing industry:

- Dairy, fruits & vegetable processing
- Grain processing
- Meat & poultry processing
- Fisheries
- Consumer foods including packaged foods, beverages and packaged drinking water.

Industries which use agriculture inputs for manufacturing of edible products are also included in it. In way this food processing industry provides vital linkages and synergies between industry and agriculture. The food processing industry sector is one of the largest in terms of production, consumption, export and growth prospects.

The ministry of food processing industries (MOSPI) is a ministry of the government of India responsible for formulation and administration of the rules and regulations and laws relating to food processing in India. the ministry was set up in the year 1988, with a view to develop a strong and vibrant food processing industry, to create increased employment in rural sector and enable farmers to reap the benefits of

modern technology and to create a surplus for exports and stimulating demand for processed food.

Food processing industry comprises of three segments based on levels of processing.

Primary processing of food comprises of sorting, grading and packaging of fruits and vegetables, milk, rice, spices, etc. Secondary processing of food comprises of re-shaping of food for ease of consumption. It includes flour, oil cakes, tea leaf and beverages powder etc. Tertiary Processing of Food (or) Value Added Food Segment includes processed fruits and vegetables, juices, jam & jelly etc.

Food Processing Industry is the most important segment in the world because it has major contribution in the survival of the people in the societies and Gross Domestic Product in India. Therefore, I have taken this sector to study and analyze.

### Literature Review

John Connor, Dale Heien, Jean Kinsey, and Robert [3] Will in their study discussed about the structure of the demand for food, costs of production and supply, and competitive structure of the industry as economic forces shaping the food processing industry. The study surveys the trends in these economic forces over the past three decades that are likely to prove useful for managerial decisions in the future.

Bhupat M Desai, N V Namboodiri [4] this paper has analysed development and financial performance of selected food-processing industries, food grains milling, edible oilseeds processing, sugarcane processing and milk processing all of which produce mass consumption goods. It prioritises these

industries for development based on the performance criteria and discusses strategies.

Paul G. Giddings [5] in paper discussed about the economic factors affecting most segments of the food processing industry and also give brief review is to point out some of the problems and uncertainties which, in our judgment, tend to make food processing a relatively unattractive area for investment at today's high multiples of earning.

Caroline Lloyd & Susan James [6] in this article examine the impact of supply chain pressures on the UK food processing industry and the implications for occupational health and safety. Based upon case studies in three meat processing plants, the research found that although the number of accidents is declining, little progress has been made in dealing with the widespread ill-health problems associated with largely repetitive and, in some cases, heavy work regimes. Supermarkets play a contradictory role in that they provide incentives to improve health and safety while at the same time their price and delivery demands have a detrimental impact.

Kumar & Parsad [1] in this article discuss the present emerging scenario of Government Policies, regulatory Frame Work and business trends in food processing industry in India. The findings and conclusion of this paper is that the India is the world's second largest producer of Food next to China, and has the potential of being the biggest in the world.

Hoover [2] in his paper study the prevention of food processing wastes and conclude that technology for treating wastes resulting from food processing is available, and is moderately successful by today's standards, it does not meet national goals set forth in the Clean Water Restoration Act of 1972. Processes need to be changed to reduce wastes, maintain product quality, and improve product yield.

#### **Objectives of Study**

- To give an overview of food processing.
- To study the effect of food processing on nutrient content of food.

#### **Government's initiatives**

In order to encourage food processing industries, increase level of processing and exploit the potential of domestic and international market for processed food products, Vision Document-2015 was prepared by the Ministry, which envisaged trebling the size of investment in the processed food sector by increasing the level of processing of perishables from 6 per cent to 20 per cent, value addition from 20 per cent to 35 per cent and share in global food trade from 1.5 per cent to 3 per cent by 2015. To achieve these targets, an investment of Rs 100,000 crore (US\$ 16 billion) is required by the year 2015.

Some of the major initiatives taken by the Government of India to progress the food processing sector in India are as follows:

Ms Harsimrat Kaur Badal, Union Minister for Food Processing Industries, Government of India has inaugurated the first of its kind Rs 136 crore (US\$ 21.76 million) mega international food park at Dabwala Kalan, Punjab.

Ministry of Food Processing Industries has a scheme for human resource development (HRD) in the food processing sector. The HRD scheme is being implemented through State Governments under the National Mission on Food Processing. The scheme has the following four components:

- Creation of infrastructure facilities for degree/diploma courses in food processing sector
- Entrepreneurship development Programme (EDP)
- Food Processing Training Centres (FPTC)
- Training at recognised institutions at State/National level

The Food Safety and Standards Authority of India (FSSAI) under the Ministry of Health and Family Welfare has issued the Food Safety and Standards (Food Product Standards and Food Additives) Regulations, 2011 and the Food Safety and Standards (Contaminants, Toxins and Residues) Regulations, 2011 which prescribe the quality and safety standards, respectively for food products.

The Ministry of Food Processing Industries has taken some new initiatives to develop the food processing sector which will also help to enhance the incomes of farmers and export of agro and processed foods among others. The government has also approved the setting up of five numbers of Mega Food Parks in the states of Bihar, Maharashtra, Himachal Pradesh and Chhattisgarh.

The Indian Institute of Packaging (IIP) has planned to offer a packaging solution to the famed Tirupati 'Laddu' to enhance its shelf life. They have also planned to install automatic vacuum packaging system for the packaging of 'Laddu' with higher shelf life.

#### **Why Food have to be Processed**

Approximately all food is processed in various ways before it is eaten. Commercially, the main reasons to process food are to remove micro-organisms (which may cause disease) and to extend shelf life.

Simply cooking or combining a food with other foodstuffs to create a recipe is also considered a form of food processing. Whatever the case, the nutrient value of any food is often changed by the processing.

### **Effects of processing and storage of food**

Some vitamins are more stable (less affected by processing) than others. Water-soluble vitamins (B-group and C) are more unstable than fat-soluble vitamins (K, A, D and E) during food processing and storage.

#### **The most unstable vitamins include**

- Folate
- Thiamine
- Vitamin C.

#### **More stable vitamins include**

- Niacin (vitamin B3)
- Vitamin K
- Vitamin D
- Biotin (vitamin B7)
- Pantothenic acid (vitamin B5).

### **Processes affecting food nutrient content**

A variety of things can happen during the growing, harvesting, storage and preparing of food that can affect its nutritional substance. Processes that expose foods to high levels of heat, light or oxygen cause the greatest nutrient loss.

#### **Fertilisers**

Most plant crops are produced with the aid of fertilised in soils. High use of nitrogen fertilisers tends to reduce the vitamin C content in many fruit and vegetable crops. It does not seem to make any difference to the plant's nutrient value whether the fertiliser is organic or not.

#### **Milling**

Cereals such as wheat can be ground to remove the stringy husks. The husks contain most of the plant's dietary fibre, B-group vitamins, photochemical and some minerals. That is why products such as white bread are less healthful than wholemeal varieties, even if they have been artificially fortified with some of the nutrients that were lost after milling. It is impossible to add back everything that is taken out, especially the phytochemicals. The 'fibre' that is added back to some products is often in the form of resistant starch, which may not be as beneficial as the fibre removed.

#### **Blanching**

Before a food is canned or frozen, it is usually heated very quickly with steam or water. The water soluble vitamins, including vitamin C and B-complex, are sensitive and easily destroyed by blanching.

#### **Canning**

Food is heated inside the can to kill any dangerous micro-organisms and extend the food's shelf life. Some types of micro-organisms require severe heat treatment and this may affect the taste and texture of the food, making it less appealing. Preservatives are generally not needed or used in canned foods. Water-

soluble vitamins are particularly sensitive to high temperatures. Many people believe that canned foods are not as nutritious as their fresh counterparts, but this is not always the case, as fresh food often deteriorates more rapidly than canned foods.

#### **Freezing**

The nutrient value of a food is retained when it is frozen. Any nutrient losses are due to the processing prior to freezing and the cooking once the frozen food is thawed.

#### **Pasteurisation**

Pasteurisation involves heating liquid foods such as milk and fruit juices to specific temperatures to destroy micro-organisms. The nutrient value of milk is generally unaffected. In the case of pasteurised fruit juices, some losses of vitamin C can occur.

#### **High pressure processing**

This alternative preservation method subjects a food to elevated pressures, with or without the use of heat to kill micro-organisms. This method has been used in foods such as fruit juices. As heat is not required, this process impacts less on the vitamin content, flavour and colour of foods.

#### **Dehydrating**

Drying out foods such as fruits can reduce the amount of vitamin C they retain, but it can also concentrate other nutrients, particularly fibre in plant foods. Dehydrating food also makes food products more energy dense, which may contribute to weight gain. If a dehydrated food is reconstituted and cooked with water, further nutrients are leached out of the food and lost in the cooking water.

#### **Preparation of vegetables**

Most vegetables are peeled or trimmed before cooking to remove the tough skin or outer leaves. But most nutrients, such as vitamins, tend to lie close to the skin surface, so excessive trimming can mean a huge reduction in a vegetable's nutrient value.

#### **Losing nutrients through cooking**

Some vitamins dissolve in water, so you lose your vitamins to the cooking water if you prefer to boil your vegetables. For example, boiling a potato can cause much of the potato's B and C vitamins to migrate into the boiling water. It is still possible to benefit from these nutrients if you consume the liquid, for example, by turning the potato and the liquid into a soup. Alternative cooking methods such as grilling, roasting, steaming, stir-frying or microwaving generally preserve a greater amount of vitamins and other nutrients.

#### **Advantage of processed food**

Food processing is a set of methods and techniques used to transform raw food ingredients into consumable food. Food processing can be as simple as

cutting up some vegetables to prepare a salad, or as complex as manufacturing a Twinkie in multiple processing facility. From the early days of food processing, the primary goal was to enlarge the life of a foodstuff, by acting as a preservative. This helped balance humans' need to eat daily with nature's trend to provide crops only during certain times of the year. Now a day, extending shelf life is one of the most important reasons food manufacturers adding so many weird sounding ingredients to products. One of the first forms of food processing, dating back to BC, was the salting of meats as a means of preservation. Sugar was introduced much later as a preservative for fruit, and thus the jam was born. Keeping food cold, either underground, or by using ice, was an effective, if ancient method of preservation until the ascent of ice boxes and recently electrical refrigeration. In the early 19th century a new technology was introduced to vacuum bottles of food for French troops. It would lead to the use of tin cans a decade later and thus the canning industry was born. Pasteurization, another French invention from the mid 19th century, greatly improved the safety of milk and milk products, as well as increasing their shelf life. Another key benefit to processing foods is the ability for producers to ensure food safety and remove or prevent dangerous toxins. Milk pasteurization, for example, removes harmful bacteria from raw milk, making it suitable for human consumption. Food processing methods that remove water, such as drying and smoking, reduce or limit the possibility of bacterial growth because the bacteria rely on the water to grow and multiply. It was only in the industrialized 20th century, and more prominently after World War II, that a third and crucial factor became the motivating force behind food processing – convenience. With legions of moms joining the work force, there was less time to toil in the kitchen, and a demand for quick, easy to prepare foods skyrocketed. Additional benefits of food processing include lower prices to consumers due to the economies of scale of mass manufacturing, increased availability of a wide variety of foods, and a consistency in taste, texture, and mouth feel. These food-processing industries through their high raw material intensity are intimately dependent on the performance of the agricultural sector which provides their raw material. Development of these industries therefore provides a forward linkage to this sector.

The significant benefits for different stakeholders involved in food processing are:

Farmer – higher yield, better farm realization, lower risk

Consumer – greater variety, lower prices, new products

Companies – new business opportunities, demand growth

Economy/Government – Employment generation, reduced rural migration

### **Disadvantage of processed food**

The further a food product is from its natural form, the less it retains its healthful nutritional properties. Vitamins evaporate, minerals are leached, and fiber is long forgotten. True, the decrease in nutrients has led to enrichment and fortification, but these add only a small number of nutrients back to a product, where hundreds of others are lost in translation from the original orange to the orange drink in a plastic bottle. Increasing shelf life requires the use of preservatives, whether natural ones such as salt or artificial chemicals that have more specific functions (mold inhibitors, bacteria killers, antioxidants, antimicrobial chemicals, etc.). Some of these preservatives have adverse side effects on some or all human populations. In order to make food more palatable and attractive, additives are used. Food colourings are a huge category of additives. The colour of a food is an important psychological consideration. But in many cases, the colour of the processed product is not as bold as expected by the consumer. Take strawberry yogurts. Almost all manufacturers add some kind of colouring, whether a natural red colour such as beet juice, a natural but quirky bug juice, or artificial Red. Despite studies that have shown correlation between food colourings and cognitive problems in children, the food industry uses them because they are cheaper than natural sources. And since cost has become a motivating factor in consumer consideration, food companies are constantly on the lookout for cheaper manufacturing techniques and cheaper source ingredients. Anything that can be made in a lab is cheaper than a naturally sourced ingredient. Substituting quality ingredients with cheaper or inferior standbys is the only way to keep prices down. Don't even ask what parts of animal carcasses go into your baloney. Farm subsidies in the US have made corn and soy products very cheap. Guess what – soy oil and high fructose corn syrup are found in many processed items. They add the fat and sweet components that make so many junk foods tasty to us. Salt is natural and cheap, but excessive consumption causes hypertension and other health problems.

### **Effect of Food Processing on Vitamins and Minerals**

Nearly every food preparation process reduces the amount of nutrients in food. In particular, processes that expose foods to high levels of heat, light, and/or oxygen cause the greatest nutrient loss. Nutrients can also be "washed out" of foods by fluids that are introduced during a cooking process. For example, boiling a potato can cause much of the potato's B and C vitamins to migrate to the boiling water. You'll still benefit from those nutrients if you consume the liquid (i.e. if the potato and water are being turned into potato soup), but not if you throw away the liquid. Similar losses also occur when you broil, roast, or fry in oil, and then drain off the drippings.

The table below compares the typical maximum nutrient losses for common food processing methods. This table is included as a general guide only.

Actual losses will depend on many different factors, including type of food and cooking time and temperature.

**Table-1: Typical maximum nutrient losses as compared to raw material**

<b>Vitamins</b>	<b>Freeze</b>	<b>Dry</b>	<b>Cook</b>	<b>Cook+Drain</b>	<b>Reheat</b>
Vitamin A	5%	50%	25%	35%	10%
Retinol Activity Equivalent	5%	50%	25%	35%	10%
Alpha Carotene	5%	50%	25%	35%	10%
Beta Carotene	5%	50%	25%	35%	10%
Beta Cryptoxanthin	5%	50%	25%	35%	10%
Lycopene	5%	50%	25%	35%	10%
Lutein+Zeaxanthin	5%	50%	25%	35%	10%
Vitamin C	30%	80%	50%	75%	50%
Thiamin	5%	30%	55%	70%	40%
Riboflavin	0%	10%	25%	45%	5%
Niacin	0%	10%	40%	55%	5%
Vitamin B6	0%	10%	50%	65%	45%
Folate	5%	50%	70%	75%	30%
Food Folate	5%	50%	70%	75%	30%
Folic Acid	5%	50%	70%	75%	30%
Vitamin B12	0%	0%	45%	50%	45%
<b>Minerals</b>	<b>Freeze</b>	<b>Dry</b>	<b>Cook</b>	<b>Cook+Drain</b>	<b>Reheat</b>
Calcium	5%	0%	20%	25%	0%
Iron	0%	0%	35%	40%	0%
Magnesium	0%	0%	25%	40%	0%
Phosphorus	0%	0%	25%	35%	0%
Potassium	10%	0%	30%	70%	0%
Sodium	0%	0%	25%	55%	0%
Zinc	0%	0%	25%	25%	0%
Copper	10%	0%	40%	4%5	0%

Source-USDA

### Effect of Food Processing on Carbohydrates

Food processing or cooking can have considerable effect on the ingredient carbohydrates. During cooking soluble carbohydrates are dissolved e.g. sucrose. Some polysaccharides get hydrolyzed. This may alter the rate and extent of digestion of starch and the properties of dietary fibre.

### Effect on Starch

Heating the food to cook it and cooling thereafter before consuming have a significant effect on the starchy components of the food. These can be understood in terms of two important phenomena. These are given below:

#### Gelatinization

On heating starch in the presence of water, the crystalline structure of the starch granules is lost irreversibly by a process called gelatinization. It is due to absorption of water by starch granules and turning into a jelly like substance. In this process, amylopectin forms the gel and amylose comes into solution. When heating is continued in excess water, more soluble components of starch come into solution and a paste results. In the food

processing, the starch granules are not completely dissolved however, their partial gelatinization is sufficient to allow a good part of the starch to be digested quickly. In the steaming of food, the process of gelatinization occurs to a small amount whereby a large proportion of slowly digestible starch is preserved.

#### Retrogradation

The process of re-association of the starch granules on cooling of the gelatinized starch or the starch paste is called retrogradation. It depends on the relative proportions of amylose and amylopectin in starch as linear amylose molecules re-associate faster than the highly branched amylopectins. Reheating starchy foods also influences this process. The digestibility of starch in the small intestine is reduced by the degree of processing and retrogradation. The staling of bread is due to retrogradation of starch and the rate of staling is temperature dependent.

#### Effect on Dietary Fibre

The cereal grains are usually milled to form refined flours, which are processed to prepare food

products. The milling process removes the fiber-rich outer layers of the grain, and diminishes the total fiber content. The flours of wheat, rye, and maize contain large amounts of cellulose and hemicelluloses. Oat and barley also lose some dietary fiber in the process of milling. Besides it heat treatment can also influence the physical structure and the functional properties of the dietary fiber. The pectin substances cause thickening of juices, also these are also responsible for mushy nature of vegetables.

### **Deteriorative Changes in Fats and Oils and their Prevention**

Food processes like heating and frying lead to polymerization of fats that leads to change in molecular weight, colour, viscosity and refractive index of the fat or the oil used. The presence of enzymes, atmospheric oxygen and application of high temperature are the factors responsible for such changes. The deteriorative changes in fats and oils are termed rancidity. In some cases containing high content of PUFA (Linolenic acid) lose the flavour giving a taste to it. This is called flavour reversion. It is of great economic concern to the food industry because it leads to the development of various off-flavours and off-odours in edible oils and fat-containing foods, which render these foods less acceptable. Lipid oxidation is one of the major causes of food spoilage. Oxidative reactions can decrease the nutritional quality of food and certain oxidation products are potentially toxic. On the other hand, under certain conditions, a limited degree of lipid oxidation is sometimes desirable, as in aged cheeses and in some fried foods.

### **Processed Food Dangers**

Resisting the urge to drink that soda pop or eat those chips can be tough, especially if you have grown habituated to eating these highly addictive foods as part of your normal diet. But once you understand a little bit more about how these and other processed foods affect your mind, body, and even your soul, it becomes easier to make healthier food choices that enrich your being rather than sap it. Here are nine motivating reasons why you should cut processed foods from your diet for good: Here are nine motivating reasons why you should cut processed foods from your diet for good:

- Processed foods are highly addictive. Your body processes whole foods much differently than it does refined, processed, and heavily-modified "junk" foods. Processed foods tend to over stimulate the production of dopamine, also known as the "pleasure" neurotransmitter, which makes you crave them constantly. Your body ends up not being able to resist the temptation to continue eating junk foods in excess, which can lead to fatness and other health problems.
- Processed foods often contain phosphates that destroy your organs, bones. Many processed

foods contain phosphate additives that augment taste, texture, and shelf-life. But these additives are known to cause health problems like rapid aging, kidney deterioration and weak bones, according to the Rodale Institute, which makes foods that, contain them far less attractive to those in the know.

- Fresh foods are actually cheaper than processed foods. People with junk food addictions often claim that fresh, healthy foods are too expensive. But according to numerous studies and assessments, whole foods made from scratch end up costing less per serving than their unhealthy, processed equivalents. According to Rodale, a single serving of 100 percent organic chilli made with fresh ingredients and grass-fed beef, for instance, is about 50 cents cheaper to make than buying a can of chemical-laden, microwaveable chilli from the grocery store.
- Processed foods cause chronic inflammation. One of the leading causes of chronic illness today is inflammation. And studies continue to show that refined sugars, processed flours, vegetable oils, and many other nasty ingredients commonly found in processed foods are largely responsible for this inflammation epidemic. So the next time your body craves a candy bar or a box of cheese crackers, consider the fact that heart disease, dementia, neurological problems, respiratory failure, and cancer have all been linked to the chronic inflammation caused by processed food consumption.
- Processed foods ruin digestion. Because they have been stripped of their natural fibers, enzymes, vitamins, and other nutrients, processed foods tend to wreak havoc on the digestive tract. Chronic consumption of such foods can throw your internal ecosystem off balance, harming beneficial bacteria and exposing your system to infection. So you can basically think of those gummy bears and that piece of cake as literal poison for your system, which may help deter you from eating them.
- Processed foods destroy your mind. If you suffer from chronic bouts of brain "fog," or have difficulty concentrating and thinking normally, chances are your diet has something to do with it. And a recent study out of Oxford University lends credence to this possibility, having found that junk food consumption can cause people to become angry and irritable. Nutrient-dense whole foods, on the other hand, can help level out your mood, sustain your

energy levels, and leave you feeling calmer and more collected.

- Processed foods are loaded with GMOs. The basic building blocks of most processed foods on the market today are derived from laboratories, not nature. Genetically-modified organisms (GMOs), which have been linked to infertility, organ damage, gastrointestinal disorders, and cancer, are prolific in processed foods. Excess consumption of these poisons promotes weight gain, acidifies your blood, and can even permanently alter the composition and function of your intestinal flora.
- Processed foods are loaded with pesticides. In order to effectively grow the GMOs used in processed foods, conventional farmers have to apply Roundup (glyphosate) and other pesticides and herbicides, many of which end up in the final product. According to data compiled by Rodale, breakfast cereals alone have been found to contain up to 70 different types of pesticides, including warehouse fumigation chemicals and other residues.
- Processed foods are not actually food. One of the ways you can assess the nutritional value of food is to see how animals, insects, bacteria, and fungi respond to it. Real foods will actually rot or grow mold, for instance, while fake, processed foods remain largely the same in appearance and shape no matter what their age. As we reported recently, processed food is essentially synthetic, and the industry that produces it admits that heavy tampering and crafty modifications are necessary to make it taste real, even though it is not.

#### **Some myth and Fact**

Consumers today are faced with a wide variety of food choices. Processed foods offer variety and enjoyment to our diets. In this article we look at some of the myths and facts about processed foods.

#### **Myth**

Processed foods offer no benefits.

#### **Fact**

Food processing makes many foods available that we could not otherwise eat.

Without food processing we certainly would not have the large variety of food products we see on supermarket and store shelves. Food processing enables the year-round availability of foods that have limited growing seasons. Frozen and canned fruits, vegetables and meat products are examples.

Processing extends the shelf life of foods. Tinned fish and UHT (ultra high temperature) milk are two examples of nutritious foods that are readily available as a result of food processing.

Processing also improves food safety by a variety of methods— for example; heating to sufficiently high temperatures destroys harmful bacteria; certain additives help prevent fats going off (rancid) and prevent the growth of harmful fungus and bacteria; packaging helps to prevent product tampering.

Convenience is another major benefit of foods that have been processed. Imagine not having frozen food or tinned vegetables for that quick and easy Sunday dinner.

**Myth:** Processed foods are not as nutritious as fresh foods.

#### **Fact**

Many processed foods are just as nutritious or in some cases even more nutritious than fresh foods that have been stored depending on the manner in which they are processed.

Frozen vegetables are usually processed within a few hours of harvest. There is little nutrient loss in the freezing process, so frozen vegetables retain their high vitamin and mineral content. In contrast, fresh vegetables are picked and transported to market. It can take days or even weeks before they reach the dinner table and vitamins are gradually lost over time no matter how carefully the vegetables are transported and stored.

Some processing methods can cause the loss of certain nutrients e.g. some vitamins and minerals are lost in cooking water or parts of the grain that are removed to produce white flour). However, the processing of foods can also add nutritional benefits. For example, lycopene, a powerful antioxidant (a protective substance for the body) found in tomatoes and watermelons, has been shown to become more available to the body (“bio-available”) when the tomatoes are processed into for example tomato paste, ketchup or soup.

#### **Myth**

The additives in processed foods are not necessary

#### **Fact**

Food additives play an important role in preserving the freshness, safety, taste, appearance and texture of processed foods. Food additives are added for particular purposes, whether it is to ensure food safety or to maintain food quality during the shelf-life of a product. For example, antioxidants prevent fats and oils

from becoming rancid while preservatives prevent or reduce the growth of microbes (e.g. mould on bread) and thickeners allow fruit preparations to “gel” so they can be spread onto toasted bread.

Food colourings are used to increase the appeal of foods. While food colourings do not impart improved safety or texture, they offer consumers a choice of products that may appeal to them or add to their enjoyment of the diet due to its colour. Food additives can supply specific sensory properties (e.g. taste and texture) to foods to meet cultural habits and consumer’s expectations.

All food additives must be approved by appropriate authorities and strict limits are placed on the amount and types of additives in foods. Any additive must be included in the ingredients listing on a package ensuring that consumers have a choice.

#### **CONCLUSION AND POLICY IMPLICATIONS**

Nutrition rich food, its availability and food safety are the area growing worldwide concern on account of their direct bearing on human health. The global food demand depends on processed food products because processing is expected to affect content, activity and bioavailability of nutrients. Processed foods discussed in this review have shown the capability of the food processing in changing the nutritive status of the food. However, the health-promoting capacity of food products strictly depends on their processing history. It is also an important point to think about the number of outbreaks of the over nutrition and obesity that is being observed in recent years due to over consumption of processed foods, but

these cases are highly related to ‘ready-to-eat’ and minimally processed foods. For these facts the innovative technologies and advancements are needed to overcome the above consequences of the food processing. The combinations of traditional and modern food processing methods and research advancements in techniques can provide a major way to enhance food quality.

Good nutrition is one of the keys to good health. You can improve your nutrition by regularly eating foods that have a lot of vitamins and minerals in them, such as fruits, vegetables, whole grains and low- or non-fat dairy.

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