



TIGR²ESS
Transforming India's Green Revolution
by Research and Empowerment for
Sustainable food Supplies



2022

Costing a Nutritionally Balanced Organic Thali



Life of an Organic Farmer

*Though mosquitoes suck my blood without my permission,
They rely after all on our blood donation.
The sharp sugar cane leaves do cut my flesh while weeding,
No pain no gain, plants will grow well, thanks to my bleeding.
Horse flies do harass me too, thinking I'm a donkey,
Or because I'm white, they assume I am a Yankee.
Ants hiding behind the leaves bite me mercilessly,
They save themselves, nothing against me personally.
While sweating like a horse, I think life is beautiful,
I don't have to go to the Turkish bath, and that's cool.
Like a soldier, a farmer has to shed sweat and blood.
He may harvest his crop after facing drought or flood.
The monsoon can bring hope, but also devastation,
He prays for it, rains guarantee food for the nation.
A farmer can sow seeds, work hard and hope for the best,
For it is through God's Grace, if one day he can harvest.
In Punjab, wheat and rice are the main cultivation,
The only crops favoured by the green revolution.
Punjabis don't relish rice, it's not their cup of tea,
To grow food we don't eat is a great absurdity.
Organic farmers don't believe in using pesticide,
To work against nature is like committing suicide.
To pollute soil and water is not sustainable,
And produce pure and safe food, is only sensible.
Multi cropping combined with a wise crop rotation,
Can protect the soil from any deterioration.
Such farming does not rely on petrochemistry,
It provides healthy food for home and the country.
Such farmers who produce their food are self-reliant,
They won't make a fortune, but they are self-sufficient.
Hard work and organic food keep the farmer healthy,
If one stays in poor health, what's the point of being wealthy.
Farmers who feed the world are looked upon with contempt,
But when there is a lockdown, they are self-sufficient.
Do boost your immune system in time of pandemic,
Organic food will help you along with turmeric.*

Darshan Singh Rudel
(Raza Farm, Nurpur Bedi)

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About TIGR²ESS

Objectives and Outcomes Jointly Framed by the Consortium Partners

India's Green Revolution produced significant benefits. The greatest positive impact was felt in regions and on farmers who were able to harness benefits from the combination of new technologies, increased inputs and research-led innovation that have characterised agrarian transformation over the last fifty years. Despite these positive outcomes, there is widespread agreement that the 21st century demands new thinking to address new and emergent challenges, driven by changes in migration and settlement patterns, new forms of economic activity, changes in global commodity markets, and significant environmental challenges.

Objectives

1. To define the requirements and set the policy agenda for a second Green Revolution in India, framed by demographic changes affecting rural communities and feminisation of smallholder farming systems.
2. To develop and strengthen alliances across a carefully selected network of UK and Indian experts to build a collaborative, long-term research partnership in sustainable agriculture that will set India on the path to a second Green Revolution.

Flagship Projects

Objectives were attained through fundamental research, structured into six Flagship Projects.

- **FP1** Sustainable and Transformative Agrarian and Rural Trajectories (START);
- **FP2** Crop Sciences: Water Use and Photosynthesis;
 - Improving Water Use and Yield Stability in Millet and Sorghum;
 - Crop Sciences: Enhancing Photosynthesis;
- **FP3** Heat and Drought Resilience in Wheat;
- **FP4** Water Use and Management in a Changing Monsoon Climate;
- **FP5** Supply Chains: Modelling Water Use for Sustainable Livelihoods;
- **FP6** Impacting Wellbeing in Rural and Urban Communities: Education, Empowerment and Entrepreneurship Leading to Improved Human Nutrition;
 - Education Food, Nutrition and Empowerment (EFNE);
 - Education, Employment, Empowerment and Entrepreneurship (4E);
 - Cross-Cutting FP6 Projects are the Mobile Teaching Kitchens and the Innovation Farm Model.

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Executive Summary

Affordability is probably an impediment to improving diets in India. However, evidence for the relationship between the healthfulness of foods and price is scarce. In addition, little is known about the underlying cost taxonomies for alternate food systems. To address these gaps in the literature, the present study endeavours to determine the cost of a nutritionally balanced, healthy North-Indian vegetarian thali (platter) for moderately active females and males. Further, the price differential between organic and conventional thalis has been determined.

This research is an exploratory attempt to quantify what it costs to prepare nutritionally balanced organic and conventional North-Indian vegetarian lunch and dinner thalis for an Indian adult male and female engaged in moderately active work. The quantities and nutritional value of dishes are based on Nutrient Requirements for Indians (Indian Council of Medical Research-National Institute of Nutrition, 2020). DietCal was used for dietary calculations. Food items were priced (as of February 27th 2002) from the online grocery store BigBasket (<http://bigbasket.com>), which has a comprehensive catalogue of food products, including organics. Two stages of accounting led to cost accumulation and assignment to the cost object, i.e., the thalis. Further, differential costing of the organic vis-à-vis conventional thali was determined.

From a nutritional point of view, the Indian thali is a balanced meal providing both macro- and micro-nutrients. However, organically grown ingredients are relatively more expensive than conventional ones, from between 4 per cent to 358 per cent. The total cost per day of two square meals (in terms of organic thalis) is ₹215.66 for females and ₹252.05 for males. The total cost per day of two square meals for organic thalis is ₹216 for females and ₹252 for males. Further, the organic thalis are slightly over 50 per cent more expensive than conventional ones.

The tradeoff between sustainability and affordability challenges our food system. Depending on the rural-urban linkage, organic prices vary considerably between the point of origin vis-à-vis sales. Direct organic marketing initiatives can be a win-win situation for producers and consumers, leading to a ready market and better access at lower prices. Enhanced research and extension services on organic best practices are the need of the hour. From a policy perspective, a gradual expansion of organic agriculture and the integrating of best organic management practices into conventional farming is the way forward.

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We are indebted to our colleagues at Panjab University, especially the Department of Public Administration, University Institute of Hotel and Tourism Management, and University Business School, in our pursuit of research across inter-disciplinary issues. We thank Kalyani Singh for her dietary inputs on the North Indian thalis, cooked sumptuously and captured perfectly in photographs. Our sincere thanks to Prof. Sumantra (Shumone) Ray (NNEdPro Global Institute for Food, Nutrition and Health) for his expert insights and direction.

We have depended on support and advice from many stakeholders, especially catering service providers. Our young talented research team's consistent perseverance and efforts are highly appreciated. Their multitasking skills contributed to every aspect of research. It has been a great pleasure to work with them. We are most grateful for their well-meaning engagement and thought-provoking suggestions for the way ahead. We also put on record the administrative support provided to us by the Department of Public Administration, Panjab University.

It is a pleasure to acknowledge our resilient and steadfast Principal Investigator, Prof. Ramanjit Kaur Johal. Her mentorship skills, unstinting spirit, constant nudge, and upfront observations made it possible to work on myriad themes and connect with our roots. I am glad we made such a good team and took our work to another level.

Suveera Gill

July 29th 2022

Abbreviations

µg	Microgram
CHO	Carbohydrate
g	Grams
kg	Kilograms
LPG	Liquified Petroleum Gas
mg	Milligram
PGS	Participatory Guarantee System

Conversion Table

Weight

1 hg = 100 gram

1 kg = 2.2046 pounds (lb)

1 kg = 35.274 ounce (oz)

1 lb = 0.4536 kg

1 oz = 28.3495 gram

Units

1 crore = 10 million

1 million = 10 lakh

1 lakh = 100000

1 billion = 1000 million

1 Economics of Balanced Nutritious Diet

Agriculture can address nutritional and health problems by providing good quality harvests at affordable prices (Welch and Graham, 1999). Agricultural activities lead to economy-wide effects by contributing to rural livelihood that can kick-start state-sponsored intervention programmes on health and nutrition. The agriculture-nutrition-health nexus extends beyond the production to transverse across the value chain with associated consumer benefits. Improved processing practices, transportation, and storage infrastructure can reduce food wastage and loss. Further, locally-grown fresh produce plugs the potential leakage of diet choice through imports, thus accounting for the sustainability implications of changing trade patterns (Finley et al., 2017).

Over the last five decades, agricultural advances, such as the Green Revolution, have seen a remarkable spurt in cereal production and yields. Such agricultural intensification has fed teeming millions at the cost of people's health and natural degradation. However, the paddy-wheat monoculture was at the cost of millet, gram, lentils and oilseeds production (Gowda et al., 2013; Kumar, 2019; Srivastava et al., 2016). Serious concerns also remain about the nutrition and health situation with people subject to extreme hunger on the one hand and the rising presence of the obese and overweight on the other. Further, many suffer from hidden hunger with deficiencies of essential vitamins and minerals associated with adverse health and economic impacts. Furthermore, water, fertiliser and electricity subsidies have led to perverted production and consumption choices.

The choice of alternative cultivation systems should be evaluated, going beyond focusing on increased food production to overcome poor health and malnutrition. Organic agriculture is a sustainable option due to the reduced use of chemical fertilisers, pesticides, and antibiotics, which are supposed to potentially contribute to health and dietary needs (Brandt and Mølgaard, 2001; Winter, 2012; Mie et al., 2017). Some systematic differences in the nutritional content (e.g., nitrogen, protein, phosphorous, phenolics, and vitamin C) have been observed, though it is difficult to significantly substantiate that organic food improves health (Briviba et al., 2007; Lauridsen et al., 2008; Tsochatzis et al., 2012). However, the bioavailability and the nutrient quality of organic vis-à-vis conventional foods are better (Magkos et al., 2003; Rosen, 2010), especially those proposed by the longitudinal studies (Vigar et al., 2019). Regular organic food consumers exhibit a plant-based diet and better compliance with the guidelines for a healthy lifestyle (Kesse-Guyot et al., 2013; Eisinger-Watzl et al., 2015). Furthermore, consumer sensory panels show a preference for the taste of organic

foods (Reganold et al., 2010). Resting on local values and knowledge (Coombes and Campbell, 2002), organic practices emit much fewer greenhouse gases and potentially sequester significant amounts of carbon in the soil (Pimentel et al., 2005).

Various factors affect dietary choice (Lee et al., 2011). However, perceived low affordability has been reported as a critical barrier to purchasing healthy foods, specifically amongst low socio-economic groups (Burns and Friel, 2007; Williams, 2011; Lee et al., 2013). Several studies have evaluated that healthier foods or diets cost more (Jetter and Cassady, 2006; Bernstein et al., 2010; McDemott and Stephens, 2010; Rehm et al., 2011, Ryden and Hagfors, 2011). The high price of organic foods and the lack of transparency in setting prices are challenges in developing a positive attitude towards organic food (Grunert and Juhl, 1995; Maguire et al., 2001). High price generates fewer repeat purchases and more cross-purchase of organic products than low or medium prices (Marian et al., 2014). However, increasing trust in organic food labels could reduce price sensitivity (Wu et al., 2011). Interestingly, some evidence shows seasonal organic produce from local farmers' markets consistently costs less and is fresh (Trobe, 2008).

The premium charged on organic food compared to conventional food varies significantly across countries depending on the source of origin (Sahota, 2008) and product group (Greene, 2001). Notably, the price of chemically grown food does not include externalities such as the costs of health impacts, farmland erosion, pollution clean-up, water treatment, climate adaptation, and agricultural subsidies. Brown and Sperow (2005) used a shopping list based on two weeks of menus for a family of four to compare prices of organic with non-organic foods. They observed that an all-organic diet requires payment of a 49 per cent price premium, resulting in a more significant budget share for food or significantly higher income levels to maintain budget share. According to Winter and Davis (2006), organic products typically cost 10 per cent to 40 per cent more than similar conventionally produced products. The additional total costs may be explained by the high production costs (mainly labour costs) and the lack of structuration of the organic agricultural sector with a small market share (Seconda et al., 2017).

In India, on average, food prices increased by 4.48 per cent every month between January 2014 and March 2022.¹ On organic food, the price premium ranges from 10 per cent to 100 per cent (Narayanan, 2005). Affordability is probably an impediment to improving diets

¹<https://mospi.gov.in/documents/213904/416359//CPI%20Press%20Release%20March%2020221649764864654.pdf/d6df2386-de76-907d-f360-98dadd6b818f>

in India (Rao et al., 2013). However, the evidence for the relationship between the healthfulness of foods and price is scarce. In addition, little is known about the underlying cost taxonomies for alternate food systems. To address these gaps in the literature, this study endeavours to determine the cost of a nutritionally balanced healthy North-Indian thali (platter) for moderately active females and males. Further, the price differential between organic and commonly available conventional thali has been determined. Here, organic implies food produced by the organic farming method. Organic farming is a farming system that follows ecologically based pest controls and biological fertilisers mainly derived from animal and plant wastes and nitrogen-fixing cover crops. Conventional is other than organic, i.e., the predominant agriculture applied in one region, generally using high-input including synthetic chemical fertilisers, fungicides, insecticides, and herbicides (Viaux, 1999).

2 Methods and Tools

This research is an exploratory attempt to quantify what it costs a representative four-member household to prepare two full, balanced meals per day (lunch and dinner) for a vegetarian organic and conventional nutritionally balanced North-Indian thali. Here, the reference is of an Indian adult male and female who are engaged in moderately active work. Typically, lunch and dinner constitute sixty per cent of the daily dietary requirement of a healthy person. The quantities and nutritional value of dishes for the preparation of a thali are based on the dietary guidelines prescribed for Indians according to Nutrient Requirements for Indians (Indian Council of Medical Research-National Institute of Nutrition, 2020).² DietCal, a software which is a professional dietary assessment and planning tool based on the ICMR-NIN data, was used for nutritional calculations. It is expected that the estimated prices are likely to rightly assess the cost of a meal to the average household. The primary energy source in Indian diets is predominantly plant-based foods consisting of carbohydrates, fats and proteins (Mann, 2007). Furthermore, a sustainable diet is generally considered plant-based (Baudry et al., 2017). Accordingly, menus include local and seasonal food items and popular recipes to provide a balanced vegetarian diet for moderately active women (55 kg body weight) and moderately active men (65 kg body weight) with 2,135 kcal/day and 2,690 kcal/day energy requirements, respectively.

The vegetarian thalis consist of a serving of cereals/millets (wheat, rice, and sorghum), vegetables (pumpkin, onions, tomatoes, carrots, beetroot, cucumber, coriander, mint, garlic and

² https://www.nin.res.in/RDA_Full_Report_2020.html

ginger), pulses (black urad gram, red kidney beans, and mung dal), fats and oil (ghee, butter and mustard oil), dairy products (milk, curd, and cheese/paneer), and dried fruits (raisins and almonds). Other commodities include sweeteners (jaggery) for kheer and spices and condiments used in the preparation of the vegetable and dal recipes. Ghee and mustard oil are the preferred cooking medium in North India. For fuel, cooking gas (liquified petroleum gas or LPG) prices have been taken as it is generally used in most households; thus, it is implicit that the electricity used for preparing and cooking food is negligible. An estimate of labour and water charges has been by taking a cook's wage per month (with no helper) and the cost of a water tank, respectively. It has been assumed that there are no rental charges for the facility used for operating and cooking as the thalis are for household consumption.

Thali cost indicates the cost of consuming a healthy platter of food using organic vis-à-vis conventional ingredients. Cost measurement requires determining the quantity of resources used and the unit price by which each of these quantities needs to be multiplied to arrive at a monetary cost. Total costs include the costs of all processing and non-processing resources, or all fixed and variable resources, or all direct and indirect resources. The total cost of a thali comprises the costs of all resources used to prepare it. The direct costs include direct material cost, i.e., the cost of all ingredients (e.g., cereals, vegetables, pulses, dairy products, fats and oils) that can be directly traced to the dish prepared. Since the cost of spices and condiments is trivial, they are considered a part of direct material/ingredient costs. A cook's wage is the direct labour cost, which is implicitly fixed in nature, i.e., the wage will remain the same per month irrespective of the dishes cooked. The facilities used to cook (LPG and water usage) are the indirect or kitchen overhead costs. The cost statement for lunch and dinner thalis has been prepared separately for females and males.

Food items were priced (as of February 27th 2002) from the online grocery store BigBasket (<http://bigbasket.com>), which has a comprehensive catalogue of food products, including organics. In addition, the online store offers Participatory Guarantee System (PGS) certified organic vegetables and staples. First, the minimum retail price was recorded with the purchase pack weight (in grams). Then, the standard shelf price from the available brands, irrespective of specials/discounts, was chosen. Finally, the cost per unit for each ingredient was calculated by dividing the purchase price by the associated weight in grams.

3 Menu Composition and Food Diversity

The menu items included in the lunch and dinner thalis comprised seven and five dishes, respectively, based on the North Indian cooking methods used for preparation, as shown in

Tables 1 and 2. Combining at least two grains, one lentil, some vegetables (cooked and uncooked), savoury chutney, raita, mustard oil, ghee and spices make the thali wholesome.

Table 1 Menu Composition for the Vegetarian Lunch Thali (One Serving)

Dish	Ingredients	Recipe Units (grams)	
		Female	Male
Recipe Name: Dal Maharani Main Course Preparation Time: 15 minutes Cooking Time: 30 minutes Total Time: 45 minutes	Black urad gram whole dried raw	25.00	35.00
	Red kidney beans dried raw	5.00	10.00
	Garlic raw	5.00	5.00
	Ginger fresh	3.00	5.00
	Onions raw	20.00	30.00
	Tomatoes standard raw	20.00	30.00
	Mint fresh	3.00	5.00
	Mustard oil	7.50	10.00
	Asafoetida	0.50	0.50
	Cumin seeds whole or ground	1.00	1.00
	Coriander seeds whole or ground	1.00	1.00
	Bay leaf dried	0.60	0.60
	Chilli green raw	5.00	5.00
	Turmeric ground	0.50	0.50
Salt	2.00	2.50	
Recipe Name: Kadoo Ki Salooni Main Course Preparation Time: 15 minutes Cooking Time: 25 minutes Total Time: 40 minutes	Pumpkin flesh raw	70.00	70.00
	Onions raw	20.00	20.00
	Tomatoes standard raw	20.00	20.00
	Mustard oil	6.00	6.00
	Chilli green raw	5.00	5.00
	Turmeric ground	1.00	1.00
	Salt	2.00	2.00
Recipe Name: Jeera Rice Side Course Preparation Time: 10 minutes Cooking Time: 25 minutes Total Time: 35 minutes	Rice white long grain raw	20.00	30.00
	Ghee	5.00	5.00
	Cumin seeds whole or ground	1.00	1.00
	Pepper black	0.20	0.20
	Salt	1.50	1.50
Recipe Name: Chapati (Indian flatbread) Side Course Preparation Time: 15 minutes Cooking Time: 10 minutes Total Time: 25 minutes	Flour wheat wholemeal	25.00	30.00
	Butter unsalted	4.00	5.00
Recipe Name: Salad Side Course Preparation Time: 15 minutes Cooking Time: NA Total Time: 15 minutes	Carrots old raw	50.00	50.00
	Beetroot	25.00	25.00
	Cucumber raw flesh and skin	50.00	50.00
	Tomatoes standard raw	25.00	25.00
	Lemon juice	5.00	5.00
Recipe Name: Mint Raita Main Course Preparation Time: 15 minutes Cooking Time: NA Total Time: 20 minutes	Yoghurt whole milk plain	35.00	35.00
	Fresh mint	5.00	5.00
	Roasted cumin powder	1.00	1.00
	Salt	1.00	1.00
Recipe Name: Coriander Chutney Side Course Preparation Time: 10 minutes Cooking Time: NA Total Time: 10 minutes	Coriander fresh raw	20.00	20.00
	Onions raw	10.00	10.00
	Chilli green raw	10.00	10.00
	Pepper black	0.50	0.50
	Salt	1.50	1.50

Note: NA implies not applicable

Source: Menu planned by Chef. Jaswinder Singh (University Institute of Hotel and Tourism Management, Panjab University)

Table 2 Menu Composition for the Vegetarian Dinner Thali (One Serving)

Dish	Ingredients	Recipe Units (grams)	
		Female	Male
Recipe Name: Moong Dal Tadka Main Course Preparation Time: 10 minutes Cooking Time: 30 minutes Total Time: 40 minutes	Mung dal yellow	30.00	45.00
	Onions raw	20.00	20.00
	Tomatoes standard raw	20.00	20.00
	Garlic raw	2.00	5.00
	Ginger fresh	2.00	5.00
	Mustard oil	5.00	7.50
	Asafoetida	0.50	0.50
	Cumin seeds whole or ground	1.50	1.50
	Chilli green raw	5.00	5.00
	Turmeric ground	1.00	1.00
	Salt	2.00	2.50
Recipe Name: Paneer Bhurji Main Course Preparation Time: 10 minutes Cooking Time: 25 minutes Total Time: 35 minutes	Paneer (cottage cheese)	30.00	40.00
	Onions raw	20.00	25.00
	Tomatoes standard raw	20.00	25.00
	Mustard oil	5.00	7.50
	Cumin seeds whole or ground	0.70	1.00
	Peppers capsicum chilli green raw	5.00	5.00
	Turmeric ground	0.90	1.00
	Salt	2.00	2.50
Recipe Name: Chapati (Indian flatbread) Side Course Preparation Time: 15 minutes Cooking Time: 10 minutes Total Time: 25 minutes	Flour wheat wholemeal	25.00	45.00
	Butter unsalted	4.00	10.00
Recipe Name: Salad Side Course Preparation Time: 15 minutes Cooking Time: NA Total Time: 15 minutes	Cucumber raw flesh and skin	50.00	50.00
	Onion standard raw	25.00	25.00
	Tomato standard raw	50.00	50.00
Recipe Name: Sorghum Kheer Dessert Preparation Time: 10 minutes Cooking Time: 30 minutes Total Time: 40 minutes	Sorghum	20.00	20.00
	Milk whole pasteurised average	80.00	80.00
	Jaggery	15.00	15.00
	Soaked raisins	5.00	5.00
	Soaked almonds with skin (slivered)	5.00	5.00

Note: NA implies not applicable

Source: Menu planned by Chef. Jaswinder Singh (University Institute of Hotel and Tourism Management, Panjab University)

Dairy plays a vital role in north Indian vegetarian cuisine and is used in the form of curds, ghee or butter, paneer (cottage cheese), and kheer (pudding). In addition, various preparation and cooking techniques like kneading, steaming, poaching, shallow frying, roasting, deep-frying, parching, and tempering (Tadka) are used in Indian cooking, and most of them are employed when preparing thalis. A list of ingredients included in each dish, for

one serving size for both females and males, is as per the dietary guidelines. The weight of each menu item was measured in grams.

The lunch thalis included two kinds of cereals, wheat chapatis (Indian flat bread) and rice together with lentils (black urad gram and red kidney beans), dry pumpkin vegetable, mint raita (curds) and salad, as shown in Figure 1. The salad included an assortment of raw vegetables (carrots, beetroot, cucumber and tomatoes) with a dash of lemon. The fresh green coriander chutney is a savoury accompaniment/side dish to the lunch. Mustard oil, used mainly in North India, is the cooking medium. However, the rice is prepared in ghee (clarified butter), and chapatis are served with a spread of butter. The serving portions (in grams) differed between females and males for dal, rice, and chapatis based on the recommended daily calorie intake.

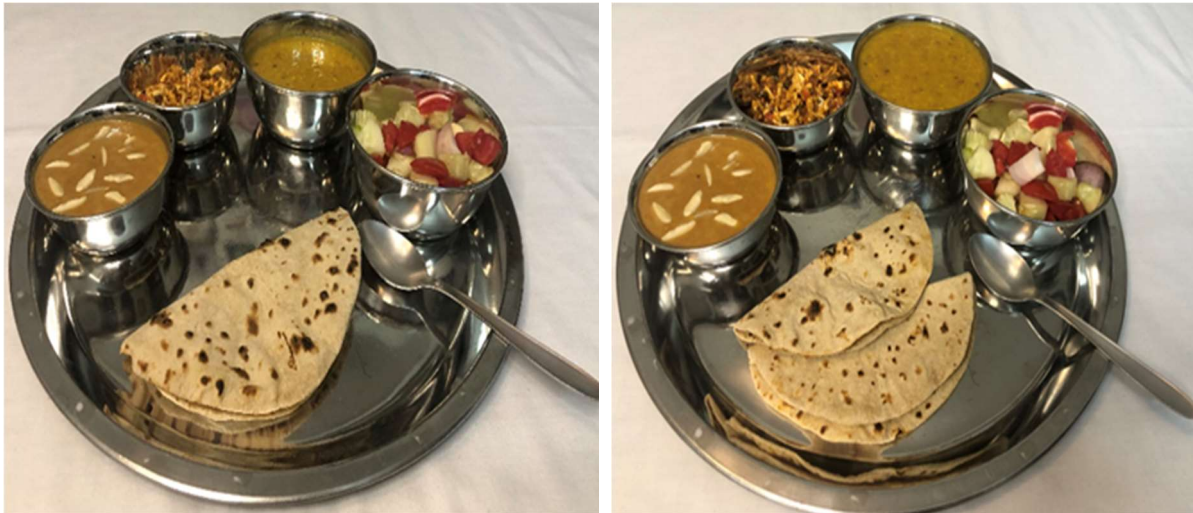
Figure 1 North Indian Vegetarian Lunch Thali



Source: According to the recipe, one serving portioned size for females (left) and males (right) by Kalyani Singh (Assistant Professor, Food and Nutrition)

As depicted in Figure 2, the dinner thalis included two kinds of cereal, wheat for chapatis and sorghum (Indian millet or jowar) for kheer (pudding). Mung Dal Tadka, which is light and easily digestible, is the lentil choice accompanying Paneer Bhurji (scrambled). The salad bowl includes raw cucumber, onions and tomatoes. Other ingredients include spices and condiments to prepare the dal and vegetable recipes. The dinner thali has a healthy sweet dish, sorghum kheer, which is slow-cooked in milk and sweetened with jaggery and soaked raisins. Jaggery is a natural sweetener prepared from sugarcane juice in north India. The kheer is garnished with skinned and slivered almonds. Like the lunch thali, serving portions differed for dal, Paneer Bhurji, and chapatis, with larger quantities for males vis-à-vis females.

Figure 2 North Indian Vegetarian Dinner Thali



Source: According to the recipe, one serving portioned size for females (left) and males (right) by Kalyani Singh (Assistant Professor, Foods and Nutrition)

4 Calories and Nutritional Value

From a nutritional point of view, Indian thali is a balanced meal providing both macro- and micro-nutrients. The nutritional value of the meals for lunch and dinner is presented in Table 3. Amongst macro-nutrients, the thalis are enriched with carbohydrates (starch, sugar and fibre). Starch is plenty in cereals and lentils, while fibre is in cereals, vegetables, and nuts. Naturally occurring sugars are in beetroot, milk, and jaggery. For vegetarians, legumes and nuts are good sources of proteins. Dairy products, such as milk, paneer and yoghurt, also contain protein. Sources of unsaturated fats in the thali are oils and nuts. Saturated fats are mainly in dairy products. Micronutrients include vitamins (A, B9 or folates, B12, and C) and minerals (sodium, calcium, phosphorus, iron, iodine). Vitamins in A are fat-soluble, whereas folates (B9), B12 and C are water-soluble. The energy distribution for thalis meant for females is 560 kcal for lunch and 720 kcal for dinner. Similarly, for males, it is 680 kcal/g and 930 kcal/g for lunch and dinner. This constitutes 59.97 per cent and 59.86 per cent of the daily dietary requirement of moderately active females and males, respectively.

Annexures A and B provide detail of the dish- and ingredient-wise quantities and nutritional value of the lunch and dinner thalis for females and males. The nutritional value in terms of protein (8.72 g), fat (8.53 g), sodium (800.66 mg), calcium (85.64 mg), phosphorus (149.81 mg), iron (3.87 mg), and folates (51.60 µg) was the highest for Dal Makhani. The carbohydrates in descending order were for Jeera Rice (16.05 g), chapati (15.95 g), and Dal

Table 3 Nutritional Value of a North Indian Vegetarian Thali

Adult	Dish (One serve)	Energy (kcal)	CHO (g)	Protein (g)	Fat (g)	Sodium (mg)	Calcium (mg)	Phosphorus (mg)	Iron (mg)	Iodine (µg)	Vitamin A (µg)	Folates (µg)	Vitamin B12 (µg)	Vitamin C (mg)
Panel A: Lunch														
Female	Dal Maharani	172.93	15.90	8.72	8.53	800.66	85.64	149.81	3.87	1.83	23.60	51.60	0.00	13.42
	Kadoo Ki Salooni	76.93	4.42	1.02	6.26	786.66	31.38	29.30	0.83	1.68	66.06	15.25	0.00	20.80
	Jeera Rice	119.93	16.05	1.81	5.54	591.30	23.03	40.22	0.93	3.26	64.15	4.00	0.00	0.08
	Chapati	109.76	15.95	2.95	3.78	0.82	8.72	70.96	0.61	1.52	42.40	6.79	0.02	0.00
	Salad	39.91	7.60	1.34	0.61	35.60	30.81	101.72	0.52	2.00	1008.88	44.69	0.00	11.30
	Mint Raita	30.75	3.07	2.29	1.27	423.75	80.95	63.95	1.03	22.57	17.38	11.80	0.07	1.94
	Coriander Chutney	10.10	1.34	0.85	0.22	599.05	21.75	20.71	0.54	0.86	139.38	16.49	0.00	17.70
	Meal Total	560.31	57.48	17.77	25.64	3202.74	253.47	380.37	7.86	32.20	367.54	111.76	0.09	59.35
Male	Dal Maharani	240.76	22.99	12.57	11.33	1002.87	114.19	214.32	5.08	2.44	32.92	77.17	0.00	16.74
	Kadoo Ki Salooni	76.93	4.42	1.02	6.26	786.66	31.38	29.31	0.83	1.68	66.06	15.25	0.00	20.80
	Jeera Rice	149.41	22.82	2.34	5.56	787.39	17.38	53.35	0.79	3.68	63.16	5.53	0.00	0.08
	Chapati	132.60	19.11	3.51	4.70	1.00	10.50	85.80	0.72	1.90	53.00	8.10	0.02	0.00
	Salad	39.91	7.60	1.34	0.61	35.60	30.81	101.72	0.52	2.00	1008.88	44.69	0.00	11.30
	Mint Raita	30.75	3.07	2.29	1.27	423.75	80.95	63.95	1.03	22.57	17.38	11.80	0.07	1.94
	Coriander Chutney	10.10	1.34	0.85	0.22	599.05	21.75	20.71	0.54	0.86	139.38	16.49	0.00	17.70
	Meal Total	680.47	81.34	23.93	29.95	3636.32	306.96	569.16	9.51	35.13	1380.77	179.03	0.09	68.56
Panel B: Dinner														
Female	Moong Dal Tadka	162.48	17.28	9.96	5.89	789.51	29.13	27.68	1.66	1.74	15.27	8.70	0.00	11.63
	Paneer Bhurji	158.47	3.24	8.28	12.52	793.23	176.98	130.09	0.92	1.68	89.31	14.52	0.00	5.16
	Chapati	140.64	19.15	3.55	5.52	1.08	10.68	85.44	0.74	2.28	63.60	8.14	0.02	0.00
	Salad	33.49	7.16	1.06	0.12	3.40	29.35	26.14	0.35	2.42	12.22	14.77	0.00	6.05
	Sorghum Kheer	224.97	37.97	6.43	6.21	49.36	195.15	161.38	1.47	25.01	30.46	16.38	0.72	3.75
	Meal Total	720.05	84.80	29.28	30.26	1636.58	441.29	430.74	5.14	33.11	210.85	62.50	0.74	26.59
Male	Moong Dal Tadka	235.41	24.75	14.94	8.71	986.26	30.30	33.88	1.79	2.04	15.46	9.27	0.00	12.15
	Paneer Bhurji	218.33	4.06	11.18	17.52	992.52	237.11	176.32	1.24	2.09	119.37	19.89	0.00	12.455
	Chapati	217.50	28.68	5.28	9.10	1.70	16.20	129.30	1.08	3.80	106.00	12.15	0.04	0.00
	Salad	33.49	7.16	1.06	0.12	3.40	29.35	26.14	0.35	2.42	12.22	14.77	0.00	6.05
	Sorghum Kheer	224.97	37.97	6.44	6.22	49.36	195.15	161.38	1.47	25.01	30.46	16.38	0.72	3.75
	Meal Total	929.70	102.62	38.88	41.67	2033.24	508.10	527.02	5.93	35.36	283.50	72.45	0.76	34.41

Note: CHO stands for carbohydrate; 1 gram (g) = 1 g; 1 milligram (mg) = 0.001 g; 1 microgram (µg) = 0.000001 g; The quantities and nutritional value of dishes for the preparation of thali are based on the dietary guidelines prescribed for Indians according to *Nutrient Requirements for Indians* (Indian Council of Medical Research-National Institution of Nutrition, 2020). Accordingly, a balanced vegetarian diet for moderately active women (2,135 kcal/day) and moderately active men (2,690 kcal/day) has been designed, keeping in view that 60 per cent of the daily dietary requirement will be met through two full meals (lunch and dinner).

Source: Nutritional inputs given by Kalyani Singh (Assistant Professor, Foods and Nutrition).

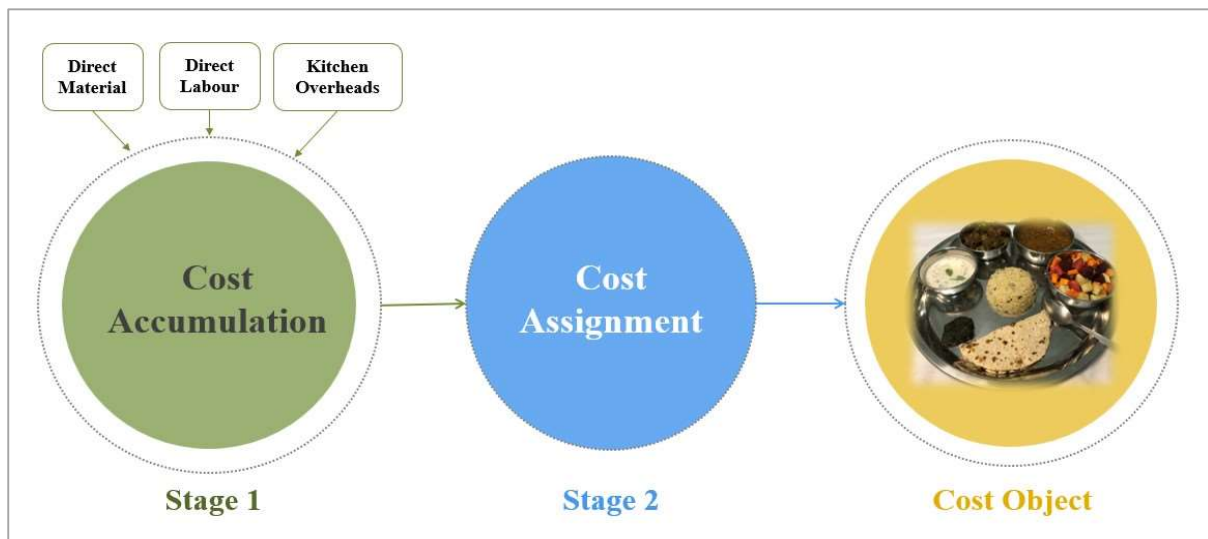
Maharani (15.90 g). Mint Raita had the highest level of iodine (22.57 µg). Due to the addition of carrots in the salad, the presence of Vitamin A was 1008.89 µg. Kadoo Ki Salooni had maximum Vitamin C (20.80 mg). Traces of Vitamin B12 was found in Mint Raita (0.07 µg) and chapati (0.02 µg). On the dinner menu, Sorghum Kheer has an abundance of carbohydrates (37.97 g), calcium (195.15 mg), phosphorus (161.38 mg), iodine (25.01 µg), folates (16.38 µg), and Vitamin B12 (0.72 µg). Moong Dal Tadka is loaded with protein (9.96 g), iron (1.66 mg), and Vitamin C (11.63 mg). Paneer Ki Bhurji has the highest fat (12.52 g), sodium (793.23 mg), and Vitamin A (89.31 µg).

For females, the number of vegetables used in cooking (dal and sabzi) and raw (salad and chutney) was the largest, equivalent to 366 g, followed by cereals used in preparing rice and chapatis (45 g) and legumes in preparation of dal (30 g) for the lunch thalis. The dairy products (yoghurt, butter and ghee) and oil (mustard) amounted to 44 g and 13.50 g, respectively. Likewise, the dinner thali in quantity composes of vegetables (219 g), cereals (45 g), legumes (30 g), and mustard oil (10 g). Milk (80 g) was used in making Sorghum Kheer and paneer for sabzi (30 g). For males, the portion sizes were bigger for lunch and dinner thalis. The cereals, legumes, and mustard oil for lunch were 60 g, 45 g, and 16 g. Similarly, the quantum of grains (65 g) and legumes (45 g) was relatively more than their counterpart for dinner. Besides salt and pepper, the typical Indian spices (asafoetida, cumin, coriander, turmeric, bay leaf) formed the base of common north Indian cuisine. Dried fruits, raisins (10 g) and almonds (10g) were used in preparing kheer.

5 Costing of the Organic Thali

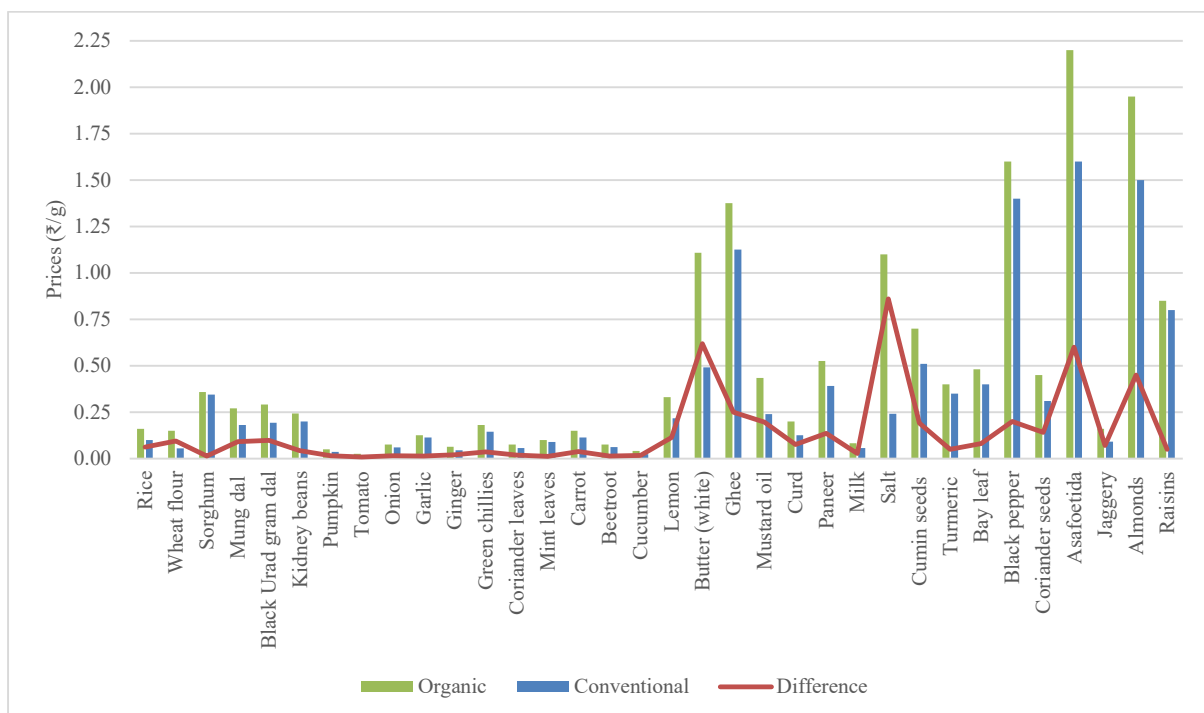
A thali is the cost object for which costs were to be accumulated. As shown in Figure 3, two stages of accounting led to cost accumulation and assignment to the cost object. The first stage involved cost accumulation (i.e., the compilation of cost data) of all the ingredients (organic and conventional), labour, and kitchen overhead costs. In the second stage, the costs are assigned to the cost object, i.e., the lunch and dinner thalis for females and males, based on their recommendatory dietary allowance. As discussed in Section 2, the direct material is the cost of all the ingredients, including spices and condiments. There is a significant difference in the costs of organic and conventional ingredients per gram, as can be observed in Figure 4. The maximum difference is in the prices of salt (₹0.86/g), butter (₹0.62/g), asafoetida (₹0.60/g), almonds (₹0.45/g), and ghee (₹0.25/g). Alternatively, the least variance of ₹0.01/g is in the prices of tomatoes, mint, garlic, beetroot, pumpkin, and sorghum.

Figure 3 Stages of Accounting for Costs



Source: Depiction by Gill

Figure 4 Price Variation between Organic and Conventional Food Items (in ₹/g)



Note: Prices as of February 27th, 2022

Source: Big Basket (<https://www.bigbasket.com/pc/fruits-vegetables/organic-fruits-vegetables/#!page=2>)

The decline in home-cooked food is contemporary, with a rise in labour market participation and wages in Indian households. However, around 90 per cent of the food consumption in the country is from home-cooked meals (Keelery, 2022). Home-cooked food results from a combination of factors, so the shadow price of home-cooked food involves the opportunity cost of time for the household and the wage of the unconstrained individual

(Griffith et al., 2022). A cook's wage is a surrogate for the opportunity cost of time for the household. It has been assumed that the preparation of food and cooking will be done by a standalone cook, with no helper. Based on inputs from cooking service providers, the daily wage rate varies between ₹150 to ₹170 for cooking in households in North India for a maximum of four members. Taking an average fixed-wage of ₹160 for two meals for four members, the cost per meal is ₹20. Thus, the direct labour cost is ₹20 per thali, which is assumed to be the same across meals, conventional and organic.

The kitchen overhead is the cost other than direct material and direct labour and includes the cost of facilities used to cook and operations, which are generally fixed. It has been assumed that there are no rental charges for facilities used to cook and operate for households. Further, electricity and water expenses are ignored as it is expected that they are negligible, as proposed by Das et al. (2021). Hence, the major kitchen overhead is the cost of cooking energy. More than 70 per cent of Indian households use Liquefied Petroleum Gas (LPG) as their primary cooking fuel (Mani et al., 2021). Indian households can purchase up to twelve domestic LPG cylinders annually at subsidised rates. Consumers who cross this set mark are charged at a non-subsidised rate.³ Accordingly, it is assumed that, on average, a household of four members uses one LPG cylinder per month. The price of a 14.2 kg domestic LPG cylinder in February 2022 was around ₹900. Taking an average LPG cost of ₹30 per day for four members, the cost per meal is ₹3.75. It is implicit that the usage of LPG will not vary for cooking organic meals. Thus, the kitchen overhead would be ₹3.75 per thali.

The cost statement for the North Indian organic lunch and dinner thali is presented in Table 4. For females, the cost of organic thali is ₹106.30 and ₹109.36 for lunch and dinner, respectively. The same for males is ₹116.56 and ₹135.49. The difference in cost is primarily

Table 4 Cost Statement for a North Indian Organic Vegetarian Thali (in ₹)

Cost Items	Female			Male		
	Lunch	Dinner	Meals	Lunch	Dinner	Meals
Direct material	82.55	85.61	168.16	92.81	111.74	204.55
Direct labour (fixed)	20.00	20.00	40.00	20.00	20.00	40.00
Kitchen overheads	3.75	3.75	7.50	3.75	3.75	7.50
Total (₹)	106.30	109.36	215.66	116.56	135.49	252.05

Note: Prices as of February 27th 2022

³<http://petroleum.nic.in/dbt/whatisdbtl.html>

due to the dietary guidelines prescribing bigger portion sizes for moderately active males vis-à-vis females. The total cost per day of two square meals (in terms of organic thalis) is ₹215.66 for females and ₹252.05 for males, a difference of around ₹36.

6 Differential Costing of the Organic vis-à-vis Conventional Thali

Differential costing is suitable when decisions involve selecting between alternatives. While making decisions, each option has to be weighed in terms of its costs compared to the other available choice. Only costs that differ in total between options in a decision are relevant. Those costs are irrelevant if they remain unchanged regardless of the selected alternative. This approach focuses attention on matters that are critical for decision-making. In the costing for thalis, the direct labour cost and kitchen overheads will remain the same irrespective of cooking for organic or conventional meals. Thus, in differential costing, these can be ignored.

In the costing of organic vis-à-vis conventional thalis, the only relevant cost for decision making is the direct material or ingredient cost. As shown in Table 5, the differential cost for females is ₹31 for lunch thali and ₹27 for dinner. While for males, it is ₹34 and ₹38 for the lunch and dinner thalis, respectively. The total differential cost for the day's two meals is ₹57 for females and ₹72 for males, which is slightly over 50 per cent more expensive than conventional ones.

Table 5 Differential Cost Statement for an Organic vis-à-vis a Conventional Thali (in ₹)

Cost Items	Female			Male		
	Organic	Conventional	Differential Cost	Organic	Conventional	Differential Cost
<i>Panel A: Lunch</i>						
Direct material cost	82.55	51.99	30.56	92.81	58.50	34.31
<i>Panel B: Dinner</i>						
Direct material cost	85.61	58.86	26.75	111.74	73.92	37.82
Total differential cost on meals/day (₹)			57.30			72.13

Note: The differential cost between organic and conventional thali is the same for direct labour and kitchen overhead.

7 Conclusion and Recommendations

The benefits of a dietary switch towards healthy and sustainable diets are increasingly recognised. However, little is known about the economic ramifications of such changes, including the affordability and costs of diets. Cost is generally a significant determinant of food choices as affordability often takes priority, particularly for consumers in lower-middle-income to low-income countries. Added, healthier dietary preferences are, on average, more expensive than less healthy ones. However, this accounts for only the explicit costs, as the implicit costs

of sickness and climate change resulting from food consumption are ignored and borne by society.

This study is an exploratory attempt to quantify the costs of preparing nutritionally balanced organic and conventional North-Indian vegetarian lunch and dinner thalis for an Indian adult male and female engaged in moderately active work. The findings show that from a nutritional point of view, the Indian thali is a balanced meal providing both macro- and micro-nutrients. However, organically grown ingredients are relatively more expensive than conventional ones, varying between 4 per cent to 358 per cent. The total cost per day of two square meals for organic thalis is ₹216 for females and ₹252 for males. Overall, organic thalis are about 50 per cent more expensive than conventional ones.

The tradeoff between sustainability and affordability challenges our food system. First, the contextual factors need to be assessed to determine the costs and benefits of organics over conventional. Further, the impact of aspects of the entire value chain across the food system, from production to processing and distribution, consumption, or recycling, needs to be considered. The assessment becomes more complex if the integrated or mixed farming system is examined. In India, organic farming is typically practised by small and marginal farmers, often situated in the proximity of neighbouring conventional farms. Though being knowledge-intensive, research and development in organic agriculture, including management of yields, crop varieties, organic pest control and use of bio-effectors, is rudimentary. However, preliminary evidence suggests that organic cultivation could reduce nutrient loss with improved local biodiversity.

Organic food typically has a substantial price premium due to lower yields, higher production costs, separate distribution channels, and limited supply. In India, consumer awareness about the safety and quality of organic products determines their willingness to pay higher prices. In a recent survey of consumers, only 34 per cent of the respondents were willing to pay the same and 33 per cent up to 25 per cent more for organic than conventionally-grown food.⁴ Affluent, health-conscious domestic consumers are concentrated in cities, away from the production source. Thus, organic sales take place through conventional food stores and supermarkets. Accordingly, depending on the rural-urban linkage, organic prices vary considerably between the point of origin vis-à-vis sales.

⁴ <https://www.statista.com/statistics/1008594/india-willingness-to-spend-on-organic-food-products/#:~:text=A%20survey%20on%20the%20willingness,food%20during%20the%20survey%20period.>

Sustainable healthy diets harmonise the economic, environmental, and social dimensions of nutrition and health. Enhanced research can guide complex interactions between dietary and food choices, sustainable agricultural systems, and human health. Extension services on organic best practices and developing domestic organic markets are the need of the hour. Direct organic marketing initiatives can be a win-win situation for producers and consumers, leading to a ready market and better access at lower prices. From a policy perspective, a gradual expansion of organic agriculture and integration of traditionally responsive and context-specific agri-sustainable management practices, such as conservation tillage, mulching, composting, and protected cropping, into conventional farming is the way forward.

References

- Baudry, J., Allès, B., Péneau, S., Touvier, M., Méjean, C., Hercberg, S., Galan, P., Lairon, D., & Kesse-Guyot, E. (2017). Dietary intakes and diet quality according to levels of organic food consumption by French adults: cross-sectional findings from the NutriNet-Santé cohort study. *Public Health Nutrition*, 20(4), 638–648. <http://10.1017/S1368980016002718>
- Bernstein, A. M., Bloom, D. E., Rosner, B. A., Franz, M. & Willett, W. C. (2010). Relation of food cost to healthfulness of diet among US women. *American Journal of Clinical Nutrition*, 92(5), 1197–1203. <http://dx.doi.org/10.3945/ajcn.2010.29854>
- Brandt, K. & Mølgaard, J. P. (2001). Organic agriculture: does it enhance or reduce the nutritional value of plant foods? *Journal of the Science of Food and Agriculture*, 81(9), 924–931. <https://doi.org/10.1002/jsfa.903>
- Briviba, K., Stracke, B. A., Rufer, C. E., Watzl, B., Weibel, F. P., & Bub, A. (2007). Effect of consumption of organically and conventionally produced apples on antioxidant activity and DNA damage in humans. *Journal of Agricultural and Food Chemistry*, 55(19), 7716–7721. <http://dx.doi.org/10.1021/jf0710534>
- Brown, C. & Sperow, M. (2005). Examining the cost of an all-organic diet. *Journal of Food Distribution Research*, 36(1), 720–26. <https://econpapers.repec.org/scripts/redir.pf?u=https%3A%2F%2Fageconsearch.umn.edu%2Frecord%2F26759%2Ffiles%2F36010020.pdf>
- Burns, C., Sacks, G. & Gold, L. (2008). Longitudinal study of consumer price index (CPI) trends in core and non-core foods in Australia. *Australian and New Zealand Journal of Public Health*, 32(5), 450–453. <https://doi.org/10.1111/j.1753-6405.2008.00278.x>
- Coombes, B. & Campbell, H. (2002). Dependent reproduction of alternative modes of agriculture: organic farming in New Zealand. *Sociologia Ruralis*, 38(2), 127–145. <https://doi.org/10.1111/1467-9523.00068>
- Das, K., Gerbens-Leenes, P. W., Nonhebel, N. (2021). The water footprint of food and cooking fuel: A case study of self-sufficient rural India. *Journal of Cleaner Production*, 281(25). <https://doi.org/10.1016/j.jclepro.2020.125255>.
- Eisinger-Watzl, M., Wittig, F., Heuer, T., & Hoffmann, I. (2015). Customers purchasing organic food - do they live healthier? Results of the German National Nutrition Survey II. *European Journal of Nutrition & Food Safety*, 5(1), 59–71. <http://dx.doi.org/10.9734/EJNFS/2015/12734>
- Finley, J. W., Dimick, D., Marshall, E., Nelson, G. C., Mein, J. R., & Gustafson, D. I. (2017). Nutritional sustainability: aligning priorities in nutrition and public health with agricultural production. *Advances in Nutrition*, 8(5), 780–788, <https://doi.org/10.3945/an.116.013995>
- Gowda, C. L. L., Srinivasan, S., Gaur, P. M., & Saxena, K. B. (2013). Enhancing the productivity and production of pulses in India. In: Climate change sustainable food security, edited by Shetty PK, Ayyappan S and Swaminathan MS, National Institute

- of Advanced Studies, Bangalore and Indian Council of Agricultural Research, New Delhi. pp 145–159. ISBN: 978-81-87663-76-8.
- Greene, C. (2001). Organic labelling. In Golan, E., Kuchler, L., Mitchell, L., Greene, C. & Jessup, A. (Eds.), *Economics of Food Labeling*, Agricultural Economic Report No. 793. Washington, DC: United States Department of Agriculture (USDA), Economic Research Service. 26–29. https://www.ers.usda.gov/webdocs/publications/41203/18893_aer793g.pdf?v=0
- Griffith, R., Jin, W., & Lechene, V. (2022). The decline of home cooked food. *Fiscal Studies*, 43(2), 1–16. <https://doi.org/10.1111/1475-5890.12298>
- Grunert, S. C. & Juhl, H. J. (1995). Values, environmental attitudes and buying of organic foods. *Journal of Economic Psychology*, 16(1), 39–62. [https://doi.org/10.1016/0167-4870\(94\)00034-8](https://doi.org/10.1016/0167-4870(94)00034-8)
- Indian Council of Medical Research-National Institute of Nutrition (2020). *Nutrient Requirements for Indians: Recommended Dietary Allowances and Estimated Average Requirements*. https://www.nin.res.in/RDA_Full_Report_2020.html
- Jetter, K. M. & Cassady, D. L. (2006). The availability and cost of healthier food alternatives. *American Journal of Preventive Medicine*, 30(1), 38–44. <https://doi.org/10.1016/j.amepre.2005.08.039>
- Keelery, S. (2022). Food service sales to home cooked food consumption India 2019. <https://www.statista.com/statistics/1299288/india-food-service-sales-to-home-cooked-food-consumption/>
- Kesse-Guyot, E., Peneau, S., Mejean, C., de Edelenyi, F.S., Galan, P., Hercberg, S., & Lairon, D. (2013). Profiles of organic food consumers in a large sample of french adults: results from the Nutrinet-Santé cohort study. *PLoS One*, 8(10), 1–13. <https://doi.org/10.1371/journal.pone.0076998>
- Kumar S, Sharma DK, Singh DR, Biswas H, Praveen KV, Sharma V (2019) Estimating loss of ecosystem services due to paddy straw burning in north-west India. *International Journal of Agricultural Sustainability*, 17(2), 146–157. <https://doi.org/10.1080/14735903.2019.1581474>
- Lauridsen, C., Yong, C., Halekoh, U., Højberg Bügel, S., Brandt, K., Porskjaer, Christensen, L., & Jørgensen, H. (2008). Rats show differences in some biomarkers of health when eating diets based on ingredients produced with three different cultivation strategies. *Journal of the Science of Food and Agriculture*, 88(4), 720–732. <https://doi.org/10.1002/jsfa.3142>
- Lee, A., Mhurchu, C. N., & Sacks, G. (2013). Monitoring the price and affordability of foods and diets globally. *Obesity Reviews*, 14(S1), 82–95. <https://doi.org/10.1111/obr.12078>
- Lee, J. H., Ralston, R. A. & Truby, H. (2011) Influence of food cost on diet quality and risk factors for chronic disease: a systematic review. *Nutrition & Dietetics*, 68(4), 248–261. <https://doi.org/10.1111/j.1747-0080.2011.01554.x>

- Magkos, F., Arvaniti, F. & Zampelas, A. (2003). Organic food: nutritious food or food for thought? A review of the evidence. *International Journal of Food Sciences and Nutrition*, 54(5), 357–371. <https://doi.org/10.1080/09637480120092071>
- Maguire, E. A., Henson, R. N., Mummery, C. J., & Frith, C. D. (2001). Activity in prefrontal cortex, not hippocampus, varies parametrically with the increasing remoteness of memories, *Neuroreport*, 12(3), 441–444. <https://doi.org/10.1097/00001756-200103050-00004>
- Mani, S., Agrawal, S., Jain, A. & Ganesan, K. (2021). *State of Clean Cooking Energy Access in India: Insights from the India Residential Energy Survey (IRES 2020)*. New Delhi: Council on Energy, Environment and Water. <https://www.ires-report-on-state-of-clean-cooking-energy-access-in-india.pdf>
- Mann, J. (2007). Dietary carbohydrate: relationship to cardiovascular disease and disorders of carbohydrate metabolism. *European Journal of Clinical Nutrition*. 61(1), S100–S111. <https://doi.org/10.1038/sj.ejcn.1602940>
- Marian, L., Chrysochou, P., Krystallis, A. & Thøgersen, J. (2014). The role of price as a product attribute in the organic food context: an exploration based on actual purchase data. *Food Quality and Preference*, 37, 52–60. <https://doi.org/10.1016/j.foodqual.2014.05.001>
- McDermott, A. J. & Stephens M. B. (2010). Cost of eating: whole foods versus convenience foods in a low-income model. *Family Medicine*, 42(4), 280–284. <https://pubmed.ncbi.nlm.nih.gov/20373171>
- Mie, A., Andersen, H. R., Gunnarsson, S., Kahl, J., Kesse-Guyot, E., Rembiałkowska, E., Quaglio, G. & Grandjean, P. (2017). Human health implications of organic food and organic agriculture: a comprehensive review. *Environmental Health*, 16(1), 111. <https://doi.org/10.1186/s12940-017-0315-4>.
- Narayanan, S. (2005). *Organic Farming in India: Relevance, Problems and Constraints*. Department of Economic Analysis and Research, National Bank for Agriculture and Rural Development, Mumbai, Occasional Paper 38. https://www.nabard.org/demo/auth/write_readdata/File/OC%2038.pdf
- Pimentel, D., Zuniga, R., & Morrison, D. (2005). Update on the environmental and economic costs associated with alien-invasive species in the United States. *Ecological Economics*, 52(3), 273–288. <https://doi.org/10.1016/j.ecolecon.2004.10.002>
- Rao, M., Afshin, A., Singh, G., & Mozaffarian, D. (2013). Do healthier foods and diet patterns cost more than less healthy options? A systematic review and meta-analysis. *BMJ Open*, 3(12). <http://dx.doi.org/10.1136/bmjopen-2013-004277>
- Reganold, J. P., Andrews, P. K., Reeve, J. R., Carpenter-Boggs, L., Schadt, C. W., Alldredge, J. R., Ross, C. F., Davies, N. M., & Zhou, J. (2010). Fruit and soil quality of organic and conventional strawberry agroecosystems. *PLoS One*, 5(10). <http://dx.doi.org/10.1371/journal.pone.0012346>

- Rehm, C. D., Monsivais, P., & Drewnowski, A. (2011). The quality and monetary value of diets consumed by adults in the United States. *American Journal of Clinical Nutrition*, 94(5), 1333–1339. <https://doi.org/10.3945/ajcn.111.015560>
- Rosen, J. D. (2010). A review of the nutrition claims made by proponents of organic food. *Comprehensive Reviews in Food Science and Food Safety*, 9(3), 270–277. <https://doi.org/10.1111/j.1541-4337.2010.00108.x>
- Ryden, P. J. & Hagfors, L. (2011). Diet cost, diet quality and socio-economic position: how are they related and what contributes to differences in diet costs? *Public Health Nutrition*, 14(9), 1680–1692. <http://dx.doi.org/10.1017/S1368980010003642>
- Sahota, A. (2008). The global market for organic food and drink. In Willer, H., Yussefi-Menzler, M., & Sorensen, N. (Eds.) *The World of Organic Agriculture. Statistics and Emerging Trends 2008*, Switzerland, Frick & Germany, Bonn: Research Institute of Organic Agriculture (FiBL) & International Federation of Organic Agriculture Movements (IFOAM). 53–58.
- Seconda, L., Baudry, J., Allès, B., Hamza, O., Boizot-Szantai, C., Soler, L. G., Galan, P., Hercberg, S., Lairon, D., & Kesse-Guyot, E. (2017). Assessment of the sustainability of the Mediterranean diet combined with organic food consumption: an individual behaviour approach. *Nutrients*, 9(1), 61. <https://doi.org/10.3390/nu9010061>
- Srivastava, P., Singh, R., Tripathi, S., & Raghubanshi, A. S. (2016). An urgent need for sustainable thinking in agriculture: an Indian scenario. *Ecological Indicators*, 67, 611–622. <https://doi.org/10.1016/j.ecolind.2016.03.015>
- Trobe, H. L. (2008). Farmers' markets: consuming local rural produce. *International Journal of Consumer Studies*, 25(3), 181–192. <https://doi.org/10.1046/j.1470-6431.2001.00171.x>
- Tsochatzis, E. D., Bladenopoulos, K., & Papageorgiou, M. (2012). Determination of tocopherol and tocotrienol content of Greek barley varieties under conventional and organic cultivation techniques using validated reverse phase high-performance liquid chromatography method. *Journal of the Science of Food and Agriculture*, 92(8), 1732–1739. <https://doi.org/10.1002/jsfa.5539>
- Viaux P. (1999). Une 3^{ème} voie en grande culture. Environnement, qualité, rentabilité. Paris: Agridécisions, 1, 211. https://infodoc.agroparistech.fr/index.php?lvl=notice_display&id=28727
- Vigar, V., Myers, S., Oliver, C., Arellano, J., Robinson, S., & Leifert, C. (2009). A systematic review of organic versus conventional food consumption: is there a measurable benefit on human health? *Nutrients*, 12(1), 7. <http://10.3390/nu12010007>
- Welch, R. M. & Graham, R. D. (1999). A new paradigm for world agriculture: meeting human needs: productive, sustainable, nutritious. *Field Crops Research*, 60(1-2), 1–10. [http://dx.doi.org/10.1016/S0378-4290\(98\)00129-4](http://dx.doi.org/10.1016/S0378-4290(98)00129-4)
- Williams, P. G. (2011). Can the poor in Australia afford healthy food? *Nutrition & Dietetics*, 68(1), 6–7. <https://doi.org/10.1111/j.1747-0080.2010.01485.x>

- Winter, C. K. & Davis, S. F. (2006). Organic foods. *Journal of Food Science*. 71(9), R117–R124. <https://doi.org/10.1111/j.1750-3841.2006.00196.x>
- Winter, C. K. (2012). Pesticide residues in imported, organic, and “Suspect” fruits and vegetables. *Journal of Agricultural and Food Chemistry*, 60(18), 4425–4429. <http://dx.doi.org/10.1021/jf205131q>
- Wu, L., Xu, L., & Gao, J. (2011). The acceptability of certified traceable food among Chinese consumers. *British Food Journal*, 113(4), 519–534. <http://dx.doi.org/10.1108/00070701111123998>

ANNEXURE A

Dish- and Ingredient-wise Quantities and Nutritional Value of North Indian Vegetarian Thalís

Table A.1 Dish- and Ingredient-wise Quantities and Nutritional Value of North Indian Vegetarian Lunch Thali for Females

Ingredients	Quantity (g)	Energy (kcal)	CHO (g)	Protein (g)	Fat (g)	Sodium (mg)	Calcium (mg)	Phosphorus (mg)	Iron (mg)	Iodine (µg)	Vitamin A (µg)	Folates (µg)	Vitamin B12 (µg)	Vitamin C (mg)
<i>Panel A: Dal Maharani</i>														
Black urad gram whole dried raw	25.00	65.00	9.36	6.21	0.35	10.00	37.86	92.86	1.57	0.00	1.50	32.86	0.00	0.00
Red kidney beans dried raw	5.00	13.17	2.03	1.10	0.07	0.90	5.00	20.67	0.32	0.00	0.10	6.50	0.00	0.20
Garlic raw	5.00	4.90	0.82	0.40	0.03	0.20	0.95	8.50	0.10	0.15	trace	0.25	0.00	0.85
Ginger fresh	3.00	1.30	0.24	0.05	0.02	0.39	0.48	1.00	0.02	trace	0.00	0.33	0.00	0.15
Onions raw	20.00	7.00	1.60	0.20	0.00	0.60	6.00	4.60	0.05	0.40	0.40	2.20	0.00	0.60
Tomatoes standard raw	20.00	3.00	0.60	0.10	0.00	0.40	1.60	4.40	0.05	0.40	11.50	4.60	0.00	4.40
Mint fresh	3.00	1.23	0.15	0.12	0.03	0.45	6.3	2.25	0.3	trace	3.6	3.3	0	0.93
Mustard oil	7.50	66.00	0.00	0.00	7.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asafoetida	0.50	0.13	trace	0.02	0.01	trace	3.50	0.25	0.11	trace	0.01	trace	0.00	0.00
Cumin seeds whole or ground	1.00	3.80	0.28	0.18	0.22	1.70	9.30	5.00	0.66	trace	1.30	0.10	0.00	0.08
Coriander seeds whole or ground	1.00	2.80	0.16	0.12	0.18	0.35	7.10	4.10	0.16	trace	0.00	0.00	0.00	0.21
Bay leaf dried	0.60	1.80	0.29	0.05	0.05	0.14	5.00	0.66	0.26	trace	3.70	0.00	0.00	0.00
Chilli green raw	5.00	1.00	0.03	0.13	0.03	0.37	1.50	4.00	0.07	trace	1.47	1.47	0.00	6.00
Turmeric ground	0.50	1.80	0.34	0.03	0.04	0.16	0.85	1.50	0.20	trace	0.02	0.00	0.00	0.00
Salt	2.00	0.00	0.00	0.00	0.00	785.00	0.20	0.03	0.00	0.88	0.00	0.00	0.00	0.00
Dish Total		172.93	15.90	8.72	8.53	800.66	85.64	149.81	3.87	1.83	23.60	51.60	0.00	13.42
<i>Panel B: Kadoo Ki Salooni</i>														
Pumpkin flesh raw	70.00	9.33	1.54	0.50	0.14	0.00	20.38	13.38	0.28	0.00	52.58	7.00	0.00	9.80
Onions raw	20.00	7.20	1.58	0.20	0.00	0.60	6.00	4.60	0.06	0.40	0.40	2.20	0.00	0.60
Tomatoes standard raw	20.00	3.00	0.60	0.10	0.02	0.40	1.60	4.40	0.04	0.40	11.60	4.60	0.00	4.40
Mustard oil	6.00	52.80	0.00	0.00	6.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chilli green raw	5.00	1.00	0.03	0.15	0.03	0.35	1.50	4.00	0.05	trace	1.45	1.45	0.00	6.00
Turmeric ground	1.00	3.60	0.67	0.07	0.07	0.31	1.70	2.90	0.40	trace	0.03	0.00	0.00	0.00
Salt	2.00	0.00	0.00	0.00	0.00	785.00	0.20	0.03	0.00	0.88	0.00	0.00	0.00	0.00
Dish Total		76.93	4.42	1.02	6.26	786.66	31.38	29.30	0.83	1.68	66.06	15.25	0.00	20.80
<i>Panel C: Jeera Rice</i>														
Rice white long grain raw	20.00	67.43	14.97	1.43	0.22	0.40	4.63	32.00	0.07	0.40	0.00	3.60	0.00	0.00
Ghee butter	5.00	44.00	trace	0.00	5.00	0.05	0.05	trace	trace	2.20	61.75	0.00	trace	0.00

Ingredients	Quantity (g)	Energy (kcal)	CHO (g)	Protein (g)	Fat (g)	Sodium (mg)	Calcium (mg)	Phosphorus (mg)	Iron (mg)	Iodine (µg)	Vitamin A (µg)	Folates (µg)	Vitamin B12 (µg)	Vitamin C (mg)
Cumin seeds whole or ground	1.00	3.80	0.28	0.18	0.22	1.70	9.30	5.00	0.66	trace	1.30	0.10	0.00	0.08
Pepper black	0.20	4.70	0.80	0.20	0.10	0.40	8.90	3.20	0.20	trace	1.10	0.30	0.00	0.00
Salt	1.50	0.00	0.00	0.00	0.00	588.75	0.15	0.02	0.00	0.66	0.00	0.00	0.00	0.00
Dish Total		119.93	16.05	1.81	5.54	591.30	23.03	40.22	0.93	3.26	64.15	4.00	0.00	0.08
<i>Panel D: Chapati</i>														
Flour wheat wholemeal	25.00	80.00	15.93	2.93	0.50	0.50	8.00	70.00	0.61	0.00	0.00	6.79	0.00	0.00
Butter unsalted	4.00	29.76	0.024	0.024	3.28	0.32	0.72	0.96	trace	1.52	42.4	trace	0.016	trace
Dish Total		109.76	15.95	2.95	3.78	0.82	8.72	70.96	0.61	1.52	42.40	6.79	0.02	0.00
<i>Panel E: Salad</i>														
Carrots old raw	50.00	17.00	3.85	0.25	0.20	13.50	13.00	8.00	0.10	0.00	980.00	4.00	0.00	1.00
Beetroot	25.00	10.75	2.40	0.40	0.05	19.50	4.01	76.50	0.20	0.00	8.25	27.21	0.00	1.23
Cucumber raw flesh and skin	50.00	7.00	0.60	0.50	0.30	2.00	10.50	11.50	0.15	1.50	6.00	7.00	0.00	1.00
Tomatoes standard raw	25.00	3.71	0.75	0.13	0.04	0.50	2.00	5.42	0.04	0.50	14.58	5.83	0.00	5.42
Lemon juice	5.00	1.45	0.00	0.06	0.02	0.10	1.30	0.30	0.03	0.00	0.05	0.65	0.00	2.65
Dish Total		39.91	7.60	1.33	0.61	35.60	30.81	101.72	0.52	2.00	1008.89	44.69	0.00	11.30
<i>Panel F: Mint Raita</i>														
Yogurt whole milk plain	35.00	28.00	2.66	1.96	1.05	28.00	70.00	60.20	0.04	22.12	11.20	6.30	0.07	0.35
Mint fresh	5.00	2.05	0.25	0.20	0.05	0.75	10.50	3.75	0.50	trace	6.00	5.50	0.00	1.55
Cumin	1.00	0.70	0.16	0.13	0.17	0.00	0.35	0.00	0.49	trace	0.18	0.00	0.00	0.04
Salt	1.00	0.00	0.00	0.00	0.00	395.00	0.10	trace	0.00	0.45	0.00	0.00	0.00	0.00
Dish Total		30.75	3.07	2.29	1.27	423.75	80.95	63.95	1.03	22.57	17.38	11.80	0.07	1.94
<i>Panel G: Coriander Chutney</i>														
Coriander fresh raw	20.00	3.40	0.24	0.40	0.10	9.20	13.40	9.60	0.36	0.00	136.00	12.40	0.00	5.40
Onions raw	10.00	3.50	0.80	0.10	0.00	0.30	3.00	2.30	0.03	0.20	0.20	1.10	0.00	0.30
Chilli green raw	10.00	2.00	0.10	0.30	0.10	0.70	3.00	8.00	0.10	trace	2.90	2.90	0.00	12.00
Pepper black	0.50	1.20	0.20	0.05	0.02	0.10	2.20	0.79	0.05	trace	0.28	0.09	0.00	0.00
Salt	1.50	0.00	0.00	0.00	0.00	588.75	0.15	0.02	0.00	0.66	0.00	0.00	0.00	0.00
Dish Total		10.10	1.34	0.85	0.22	599.05	21.75	20.71	0.54	0.86	139.38	16.49	0.00	17.70
Meal Total		560.31	57.48	17.77	25.64	3202.74	253.47	380.37	7.86	32.20	367.54	111.76	0.09	59.35

Note: CHO stands for carbohydrate; 1 gram (g) = 1 g; 1 milligram (mg) = 0.001 g; 1 microgram (µg) = 0.000001 g; The quantities and nutritional value of dishes for the preparation of thali are based on the dietary guidelines prescribed for Indians according to *Nutrient Requirements for Indians* (Indian Council of Medical Research-National Institution of Nutrition, 2020). Accordingly, a balanced vegetarian diet for moderately active women (2,135 kcal/day) and men (2,690 kcal/day) has been designed, keeping in view that 60 per cent of the daily dietary requirement will be met through two full meals (lunch and dinner).

Source: Nutritional inputs given by Kalyani Singh.

Table A.2 Dish- and Ingredient-wise Quantities and Nutritional Value of North Indian Vegetarian Dinner Thali for Females

Ingredients	Quantity (g)	Energy (kcal)	CHO (g)	Protein (g)	Fat (g)	Sodium (mg)	Calcium (mg)	Phosphorus (mg)	Iron (mg)	Iodine (µg)	Vitamin A (µg)	Folates (µg)	Vitamin B12 (µg)	Vitamin C (mg)
<i>Panel A: Moong Dal Tadka</i>														
Moong dal yellow	30.00	95.00	13.50	9.10	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Onions raw	20.00	7.00	1.60	0.20	0.00	0.60	6.00	4.60	0.05	0.40	0.40	2.20	0.00	0.60
Tomatoes standard raw	20.00	3.00	0.60	0.10	0.00	0.40	1.60	4.40	0.05	0.40	11.50	4.60	0.00	4.40
Garlic raw	2.00	2.00	0.33	0.16	0.01	0.08	0.38	3.40	0.04	0.06	trace	0.10	0.00	0.34
Ginger fresh	2.00	0.88	0.16	0.04	0.02	0.26	0.32	0.68	0.01	trace	0.00	0.22	0.00	0.10
Mustard oil	5.00	44.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asafoetida	0.50	0.13	trace	0.02	0.01	trace	3.50	0.25	0.11	trace	0.01	trace	0.00	0.00
Cumin seeds whole or ground	1.50	5.80	0.42	0.27	0.33	2.50	14.00	7.50	1.00	trace	1.9	0.15	0.00	0.12
Chilli green raw	5.00	1.07	0.00	0.00	0.00	0.36	1.43	3.93	0.00	trace	1.43	1.43	0.00	6.07
Turmeric ground	1.00	3.60	0.67	0.07	0.07	0.31	1.70	2.90	0.40	0.00	0.03	0.00	0.00	0.00
Salt	2.00	0.00	0.00	0.00	0.00	785.00	0.20	0.03	0.00	0.88	0.00	0.00	0.00	0.00
Dish Total		162.48	17.28	9.96	5.89	789.51	29.13	27.68	1.66	1.74	15.27	8.70	0.00	11.63
<i>Panel B: Paneer Ki Bhurji</i>														
Cheese Paneer	30.00	98.57	0.27	7.80	7.37	5.74	161.14	114.86	0.00	0.00	76.29	7.54	0.00	0.00
Onions raw	20.00	7.00	1.57	0.20	0.00	0.60	6.00	4.67	0.07	0.40	0.40	2.20	0.00	0.60
Tomatoes standard raw	20.00	2.97	0.60	0.10	0.03	0.40	1.60	4.33	0.03	0.40	11.67	4.67	0.00	4.33
Mustard oil	5.00	44.00	0.00	0.00	4.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cumin seeds whole or ground	0.70	2.70	0.20	0.12	0.16	1.20	6.50	3.50	0.46	trace	0.89	0.07	0.00	0.06
Chilli green raw	5.00	0.03	0.00	0.00	0.00	0.01	0.04	0.11	0.00	trace	0.04	0.04	0.00	0.17
Turmeric ground	0.90	3.20	0.60	0.06	0.06	0.28	1.50	2.60	0.36	0.00	0.03	0.00	0.00	0.00
Salt	2.00	0.00	0.00	0.00	0.00	785.00	0.20	0.03	0.00	0.88	0.00	0.00	0.00	0.00
Dish Total		158.47	3.24	8.28	12.52	793.23	176.98	130.09	0.92	1.68	89.31	14.52	0.00	5.16
<i>Panel C: Chapati</i>														
Flour wheat wholemeal	25.00	96.00	19.11	3.51	0.60	0.60	9.60	84.00	0.74	0.00	0.00	8.14	0.00	0.00
Butter unsalted	4.00	44.64	0.036	0.036	4.92	0.48	1.08	1.44	trace	2.28	63.6	trace	0.024	trace
Dish Total		140.64	19.15	3.55	5.52	1.08	10.68	85.44	0.74	2.28	63.60	8.14	0.02	0.00

Ingredients	Quantity (g)	Energy (kcal)	CHO (g)	Protein (g)	Fat (g)	Sodium (mg)	Calcium (mg)	Phosphorus (mg)	Iron (mg)	Iodine (µg)	Vitamin A (µg)	Folates (µg)	Vitamin B12 (µg)	Vitamin C (mg)
Panel D: Salad														
Cucumber raw flesh and skin	50.00	2.10	0.18	0.15	0.09	0.60	3.15	3.45	0.05	0.45	1.80	2.10	0.00	0.30
Onion standard raw	25.00	29.17	6.53	0.83	0.00	2.50	25.00	19.44	0.28	1.67	1.67	9.17	0.00	2.50
Tomato standard raw	50.00	2.23	0.45	0.08	0.03	0.30	1.20	3.25	0.03	0.30	8.75	3.50	0.00	3.25
Dish Total		33.49	7.16	1.06	0.12	3.40	29.35	26.14	0.35	2.42	12.22	14.77	0.00	6.05
Panel E: Sorghum Kheer														
Sorghum (Jowar)	20.00	70.80	16.00	2.60	0.68	1.00	70.00	42.00	0.80	0.00	0.00	6.93	0.00	2.20
Milk whole pasteurised average	80.00	51.34	3.70	2.63	2.87	33.55	95.52	76.42	0.01	24.84	30.33	6.45	0.72	1.55
Jaggery	15.00	57.83	14.44	0.08	0.00	11.81	13.88	10.88	0.24	trace	0.00	trace	0.00	0.00
Raisins	5.00	15.00	3.50	0.13	0.00	3.00	2.25	3.75	0.25	trace	0.13	0.50	0.00	0.00
Almonds with skin	5.00	30.00	0.33	1.00	2.67	0.00	13.50	28.33	0.17	0.17	0.00	2.50	0.00	0.00
Dish Total		224.97	37.97	6.43	6.21	49.36	195.15	161.38	1.47	25.01	30.46	16.38	0.72	3.75
Meal Total		720.05	84.80	29.28	30.26	1636.58	441.29	430.74	5.14	33.11	210.85	62.50	0.74	26.59

Note: CHO stands for carbohydrate; 1 gram (g) = 1 g; 1 milligram (mg) = 0.001 g; 1 microgram (µg) = 0.000001 g; The quantities and nutritional value of dishes for the preparation of thali are based on the dietary guidelines prescribed for Indians according to *Nutrient Requirements for Indians* (Indian Council of Medical Research-National Institution of Nutrition, 2020). Accordingly, a balanced vegetarian diet for moderately active women (2,135 kcal/day) and men (2,690 kcal/day) has been designed, keeping in view that 60 per cent of the daily dietary requirement will be met through two full meals (lunch and dinner).

Source: Nutritional inputs given by Kalyani Singh.

Table A.3 Dish- and Ingredient-wise Quantities and Nutritional Value of North Indian Vegetarian Lunch Thali for Males

Ingredients	Quantity (g)	Energy (kcal)	CHO (g)	Protein (g)	Fat (g)	Sodium (mg)	Calcium (mg)	Phosphorus (mg)	Iron (mg)	Iodine (µg)	Vitamin A (µg)	Folates (µg)	Vitamin B12 (µg)	Vitamin C (mg)
<i>Panel A: Dal Maharani</i>														
Black urad gram whole dried	35.00	91.00	13.10	8.70	0.49	14.00	53.00	130.00	2.20	0.00	2.10	46.00	0.00	0.00
Red kidney beans dried raw	10.00	26.33	4.07	2.20	0.14	1.80	10.00	41.33	0.64	0.00	0.20	13.00	0.00	0.40
Garlic raw	5.00	4.90	0.82	0.40	0.03	0.20	0.95	8.50	0.10	0.15	trace	0.25	0.00	0.85
Ginger fresh	5.00	2.20	0.40	0.09	0.04	0.65	0.80	1.70	0.03	trace	0.00	0.55	0.00	0.25
Onions raw	30.00	2.35	0.30	0.00	0.90	9.00	7.00	0.10	0.60	0.60	3.30	0.00	0.90	10.50
Tomatoes standard raw	30.00	0.90	0.15	0.05	0.60	2.40	6.50	0.05	0.60	17.50	7.00	0.00	6.50	4.45
Mint fresh	5.00	0.25	0.20	0.05	0.75	10.50	3.75	0.50	trace	6.00	5.50	0.00	1.55	2.05
Mustard oil	10.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	88.00
Asafoetida	0.50	0.13	trace	0.02	0.01	trace	3.50	0.25	0.11	trace	0.01	trace	0.00	0.00
Cumin seeds whole or ground	1.00	3.80	0.28	0.18	0.22	1.70	9.30	5.00	0.66	trace	1.30	0.10	0.00	0.08
Coriander seeds whole or ground	1.00	2.80	0.16	0.12	0.18	0.35	7.10	4.10	0.16	trace	0.00	0.00	0.00	0.21
Bay leaf dried	0.60	1.80	0.29	0.05	0.05	0.14	5.04	0.66	0.26	trace	3.72	0.00	0.00	0.00
Chilli green raw	5.00	1.00	0.03	0.13	0.03	0.37	1.50	4.00	0.07	trace	1.47	1.47	0.00	6.00
Turmeric ground	0.50	1.80	0.34	0.03	0.04	0.16	0.85	1.50	0.20	trace	0.02	0.00	0.00	0.00
Salt	2.50	0.00	0.00	0.00	0.00	981.25	0.25	0.03	0.00	1.09	0.00	0.00	0.00	0.00
Dish Total		240.76	22.99	12.57	11.33	1002.87	114.19	214.32	5.08	2.44	32.92	77.17	0.00	16.74
<i>Panel B: Kadoo Ki Salooni</i>														
Pumpkin flesh raw	70.00	9.33	1.54	0.50	0.14	0.00	20.38	13.38	0.28	0.00	52.58	7.00	0.00	9.80
Onions raw	20.00	7.20	1.58	0.20	0.00	0.60	6.00	4.60	0.06	0.40	0.40	2.20	0.00	0.60
Tomatoes standard raw	20.00	3.00	0.60	0.10	0.02	0.40	1.60	4.40	0.04	0.40	11.60	4.60	0.00	4.40
Mustard oil	6.00	52.80	0.00	0.00	6.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chilli green raw	5.00	1.00	0.03	0.15	0.03	0.35	1.50	4.00	0.05	trace	1.45	1.45	0.00	6.00
Turmeric ground	1.00	3.60	0.67	0.07	0.07	0.31	1.70	2.90	0.40	trace	0.03	0.00	0.00	0.00
Salt	2.00	0.00	0.00	0.00	0.00	785.00	0.20	0.03	0.00	0.88	0.00	0.00	0.00	0.00
Dish Total		76.93	4.42	1.02	6.26	786.66	31.38	29.31	0.83	1.68	66.06	15.25	0.00	20.80
<i>Panel C: Jeera Rice</i>														
Rice white long grain easy cook raw	30.00	101.14	22.46	2.14	0.33	0.60	6.94	48.00	0.11	0.60	0.00	5.40	0.00	0.00
Ghee butter	5.00	44.00	trace	0.00	5.00	0.05	0.05	trace	trace	2.20	61.75	0.00	trace	0.00
Cumin seeds whole or ground	1.00	3.80	0.28	0.18	0.22	1.70	9.30	5.00	0.66	trace	1.30	0.10	0.00	0.08
Pepper black	0.20	0.47	0.08	0.02	0.01	0.04	0.89	0.32	0.02	trace	0.11	0.03	0.00	0.00
Salt	1.50	0.00	0.00	0.00	0.00	785.00	0.20	0.03	0.00	0.88	0.00	0.00	0.00	0.00
Dish Total		149.41	22.82	2.34	5.56	787.39	17.38	53.35	0.79	3.68	63.16	5.53	0.00	0.08

Ingredients	Quantity (g)	Energy (kcal)	CHO (g)	Protein (g)	Fat (g)	Sodium (mg)	Calcium (mg)	Phosphorus (mg)	Iron (mg)	Iodine (µg)	Vitamin A (µg)	Folates (µg)	Vitamin B12 (µg)	Vitamin C (mg)
Panel D: Chapati														
Flour wheat wholemeal	30.00	95.40	19.08	3.48	0.60	0.60	9.60	84.60	0.72	0.00	0.00	8.10	0.00	0.00
Butter unsalted	5.00	37.20	0.03	0.03	4.10	0.40	0.90	1.20	trace	1.90	53.00	trace	0.02	trace
Dish Total		132.60	19.11	3.51	4.70	1.00	10.50	85.80	0.72	1.90	53.00	8.10	0.02	0.00
Panel E: Salad														
Carrots old raw	50.00	17.00	3.85	0.25	0.20	13.50	13.00	8.00	0.10	0.00	980.00	4.00	0.00	1.00
Beetroot	25.00	10.75	2.40	0.40	0.05	19.50	4.01	76.50	0.20	0.00	8.25	27.21	0.00	1.23
Cucumber raw flesh and skin	50.00	7.00	0.60	0.50	0.30	2.00	10.50	11.50	0.15	1.50	6.00	7.00	0.00	1.00
Tomatoes standard raw	25.00	3.71	0.75	0.13	0.04	0.50	2.00	5.42	0.04	0.50	14.58	5.83	0.00	5.42
Lemon juice	5.00	1.45	0.00	0.06	0.02	0.10	1.30	0.30	0.03	0.00	0.05	0.65	0.00	2.65
Dish Total		39.91	7.60	1.33	0.61	35.60	30.81	101.72	0.52	2.00	1008.89	44.69	0.00	11.30
Panel F: Mint Raita														
Yogurt whole milk plain	35.00	28.00	2.66	1.96	1.05	28.00	70.00	60.20	0.04	22.12	11.20	6.30	0.07	0.35
Mint fresh	5.00	2.05	0.25	0.20	0.05	0.75	10.50	3.75	0.50	trace	6.00	5.50	0.00	1.55
Cumin	1.00	0.70	0.16	0.13	0.17	0.00	0.35	0.00	0.49	trace	0.18	0.00	0.00	0.04
Salt	1.00	0.00	0.00	0.00	0.00	395.00	0.10	trace	0.00	0.45	0.00	0.00	0.00	0.00
Dish Total		30.75	3.07	2.29	1.27	423.75	80.95	63.95	1.03	22.57	17.38	11.80	0.07	1.94
Panel G: Coriander Chutney														
Coriander fresh raw	20.00	3.40	0.24	0.40	0.10	9.20	13.40	9.60	0.36	0.00	136.00	12.40	0.00	5.40
Onions raw	10.00	3.50	0.80	0.10	0.00	0.30	3.00	2.30	0.03	0.20	0.20	1.10	0.00	0.30
Chilli green raw	10.00	2.00	0.10	0.30	0.10	0.70	3.00	8.00	0.10	trace	2.90	2.90	0.00	12.00
Pepper black	0.50	1.20	0.20	0.05	0.02	0.10	2.20	0.79	0.05	trace	0.28	0.09	0.00	0.00
Salt	1.50	0.00	0.00	0.00	0.00	588.75	0.15	0.02	0.00	0.66	0.00	0.00	0.00	0.00
Dish Total		10.10	1.34	0.85	0.22	599.05	21.75	20.71	0.54	0.86	139.38	16.49	0.00	17.70
Meal Total		680.47	81.34	23.93	29.95	3636.32	306.96	569.16	9.51	35.13	1380.77	179.03	0.09	68.56

Note: CHO stands for carbohydrate; 1 gram (g) = 1 g; 1 milligram (mg) = 0.001 g; 1 microgram (µg) = 0.000001 g; The quantities and nutritional value of dishes for the preparation of thali are based on the dietary guidelines prescribed for Indians according to *Nutrient Requirements for Indians* (Indian Council of Medical Research-National Institution of Nutrition, 2020). Accordingly, a balanced vegetarian diet for moderately active women (2,135 kcal/day) and men (2,690 kcal/day) has been designed, keeping in view that 60 per cent of the daily dietary requirement will be met through two full meals (lunch and dinner).

Source: Nutritional inputs given by Kalyani Singh.

Table A.4 Dish- and Ingredient-wise Quantities and Nutritional Value of North Indian Vegetarian Dinner Thali for Males

Ingredients	Quantity (g)	Energy (kcal)	CHO (g)	Protein (g)	Fat (g)	Sodium (mg)	Calcium (mg)	Phosphorus (mg)	Iron (mg)	Iodine (µg)	Vitamin A (µg)	Folates (µg)	Vitamin B12 (µg)	Vitamin C (mg)
<i>Panel A: Moong Dal Tadka</i>														
Moong dal yellow	45.00	141.82	20.25	13.64	0.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Onions raw	20.00	7.00	1.57	0.20	0.00	0.60	6.00	4.67	0.07	0.40	0.40	2.20	0.00	0.60
Tomatoes standard raw	20.00	2.97	0.60	0.10	0.03	0.40	1.60	4.33	0.03	0.40	11.67	4.67	0.00	4.33
Garlic raw	5.00	4.90	0.82	0.40	0.03	0.20	0.95	8.50	0.10	0.15	trace	0.25	0.00	0.85
Ginger fresh	5.00	2.20	0.40	0.09	0.04	0.65	0.80	1.70	0.03	trace	0.00	0.55	0.00	0.25
Mustard oil	7.50	66.00	0.00	0.00	7.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asafoetida	0.50	0.13	trace	0.02	0.01	trace	3.50	0.25	0.11	trace	0.01	trace	0.00	0.00
Cumin seeds whole or ground	1.50	5.80	0.42	0.27	0.33	2.50	14.00	7.50	1.00	trace	1.90	0.15	0.00	0.12
Chilli green raw	5.00	1.00	0.03	0.15	0.03	0.35	1.50	4.00	0.05	trace	1.45	1.45	0.00	6.00
Turmeric ground	1.00	3.60	0.67	0.07	0.07	0.31	1.70	2.90	0.40	0.00	0.03	0.00	0.00	0.00
Salt	2.50	0.00	0.00	0.00	0.00	981.25	0.25	0.03	0.00	1.09	0.00	0.00	0.00	0.00
Dish Total		235.41	24.75	14.94	8.71	986.26	30.30	33.88	1.79	2.04	15.46	9.27	0.00	12.15
<i>Panel B: Paneer Ki Bhurji</i>														
Cheese Paneer	40.00	131.43	0.37	10.40	9.83	7.66	214.86	153.14	0.00	0.00	101.71	10.06	0.00	0.00
Onions raw	25.00	8.75	1.97	0.25	0.00	0.75	7.50	5.63	0.06	0.50	0.50	2.75	0.00	0.75
Tomatoes standard raw	25.00	3.75	0.75	0.13	0.03	0.50	2.00	5.63	0.06	0.50	14.38	5.63	0.00	5.63
Mustard oil	7.50	66.00	0.00	0.00	7.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cumin seeds whole or ground	1.00	3.80	0.28	0.18	0.22	1.70	9.30	5.00	0.66	trace	1.30	0.01	0.00	0.08
Chilli green raw	5.00	1.00	0.03	0.15	0.03	0.35	1.50	4.00	0.05	trace	1.45	1.45	0.00	6.00
Turmeric ground	1.00	3.60	0.67	0.07	0.07	0.31	1.70	2.90	0.40	0.00	0.03	0.00	0.00	0.00
Salt	2.50	0.00	0.00	0.00	0.00	981.25	0.25	0.03	0.00	1.09	0.00	0.00	0.00	0.00
Dish Total		218.33	4.06	11.18	17.52	992.52	237.11	176.32	1.24	2.09	119.37	19.89	0.00	12.455
<i>Panel C: Chapati</i>														
Flour wheat wholemeal	45.00	143.10	28.62	5.22	0.90	0.90	14.40	126.90	1.08	0.00	0.00	12.15	0.00	0.00
Butter unsalted	10.00	74.40	0.06	0.06	8.20	0.80	1.80	2.40	trace	3.80	106.00	trace	0.04	trace
Dish Total		217.50	28.68	5.28	9.10	1.70	16.20	129.30	1.08	3.80	106.00	12.15	0.04	0.00

Ingredients	Quantity (g)	Energy (kcal)	CHO (g)	Protein (g)	Fat (g)	Sodium (mg)	Calcium (mg)	Phosphorus (mg)	Iron (mg)	Iodine (µg)	Vitamin A (µg)	Folates (µg)	Vitamin B12 (µg)	Vitamin C (mg)
Panel D: Salad														
Cucumber raw flesh and skin	50.00	2.10	0.18	0.15	0.09	0.60	3.15	3.45	0.05	0.45	1.80	2.10	0.00	0.30
Onion standard raw	25.00	29.17	6.53	0.83	0.00	2.50	25.00	19.44	0.28	1.67	1.67	9.17	0.00	2.50
Tomato standard raw	50.00	2.23	0.45	0.08	0.03	0.30	1.20	3.25	0.03	0.30	8.75	3.50	0.00	3.25
Dish Total		33.49	7.16	1.06	0.12	3.40	29.35	26.14	0.35	2.42	12.22	14.77	0.00	6.05
Panel E: Sorghum Kheer														
Sorghum (Jowar)	20.00	70.80	16.00	2.60	0.68	1.00	70.00	42.00	0.80	0.00	0.00	6.93	0.00	2.20
Milk whole pasteurised average	80.00	51.34	3.70	2.63	2.87	33.55	95.52	76.42	0.01	24.84	30.33	6.45	0.72	1.55
Jaggery	15.00	57.83	14.44	0.08	0.00	11.81	13.88	10.88	0.24	trace	0.00	trace	0.00	0.00
Raisins	5.00	15.00	3.50	0.13	0.00	3.00	2.25	3.75	0.25	trace	0.13	0.50	0.00	0.00
Almonds with skin	5.00	30.00	0.33	1.00	2.67	0.00	13.50	28.33	0.17	0.17	0.00	2.50	0.00	0.00
Dish Total		224.97	37.97	6.43	6.21	49.36	195.15	161.38	1.47	25.01	30.46	16.38	0.72	3.75
Meal Total		929.70	102.62	38.88	41.67	2033.24	508.10	527.02	5.93	35.36	283.50	72.45	0.76	34.41

Note: CHO stands for carbohydrate; 1 gram (g) = 1 g; 1 milligram (mg) = 0.001 g; 1 microgram (µg) = 0.000001 g; The quantities and nutritional value of dishes for the preparation of thali are based on the dietary guidelines prescribed for Indians according to *Nutrient Requirements for Indians* (Indian Council of Medical Research-National Institution of Nutrition, 2020). Accordingly, a balanced vegetarian diet for moderately active women (2,135 kcal/day) and men (2,690 kcal/day) has been designed, keeping in view that 60 per cent of the daily dietary requirement will be met through two full meals (lunch and dinner).

Source: Nutritional inputs given by Kalyani Singh.

ANNEXURE B

Prices of Dish- and Ingredient-wise Organic and Conventional Food Items

Table B.1 Prices of Dish- and Ingredient-wise Organic and Conventional Food Items for Females

S. No.	Ingredient	Lunch									Dinner							
		Quantity (in g)							Price (₹/g)		Quantity (in g)						Price (₹/g)	
		Dal Maharani	Kadu Ki Saloni	JeeraRice	Chapati	Salad	Mint Raita	Coriander Chutney	Total	Organic	Conventional	Mung Dal Tadka	Paneer Bhurji	Chapati	Salad	Sorghum Kheer	Total	Organic
1.	Rice			20.00				20.00	3.2	1.98						0.00	0.00	0.00
2.	Wheat flour				25.00			25.00	3.73	1.38			25.00			25.00	3.73	1.38
3.	Sorghum							0.00	0.00	0.00					20.00	20.00	7.16	6.90
4.	Moong dal (Split)							0.00	0.00	0.00	30.00					30.00	8.10	5.40
5.	Black urad dal (whole)	25.00						25.00	7.25	4.80						0.00	0.00	0.00
6.	Red kidney beans	5.00						5.00	1.21	1.00						0.00	0.00	0.00
7.	Pumpkin		70.00					70.00	3.43	2.45						0.00	0.00	0.00
8.	Tomato	20.00	20.00			25.00		65.00	1.63	1.06	20.00	20.00		50.00		90.00	2.25	1.46
9.	Onion	20.00	20.00					50.00	3.75	3.00	20.00	20.00		25.00		65.00	4.88	3.90
10.	Garlic	5.00						5.00	0.63	0.56	2.00					2.00	0.25	0.23
11.	Ginger	3.00						3.00	0.19	0.13	2.00					2.00	0.13	0.09
12.	Green chillies	5.00	5.00					20.00	3.60	2.88	5.00	5.00				10.00	1.80	1.44
13.	Coriander leaves							20.00	1.50	1.13						0.00	0.00	0.00
14.	Mint leaves	3.00					5.00	8.00	0.80	0.71						0.00	0.00	0.00
15.	Carrot					50.00		50.00	7.50	5.63						0.00	0.00	0.00
16.	Beetroot					25.00		25.00	1.87	1.53						0.00	0.00	0.00
17.	Cucumber					50.00		50.00	2.00	1.20				50.00		50.00	2.00	1.20
18.	Lemon					5.00		5.00	1.65	1.08						0.00	0.00	0.00

S. No.	Ingredient	Dal Maharani	Kadu Ki Saloni	JeeraRice	Chapati	Salad	Mint Raita	Coriander Chutney	Total	Organic	Conventional	Mung Dal Tadka	Paneer Bhurji	Chapati	Salad	Sorghum Kheer	Total	Organic	Conventional
19.	Butter (white)				4.00				4.00	4.43	1.96			4.00			4.00	4.43	1.96
20.	Ghee			5.00					5.00	6.88	5.63						0.00	0.00	0.00
21.	Mustard oil	7.50	6.00						13.50	5.86	3.22	5.00	5.00				10.00	4.34	2.39
22.	Curd						35.00		35.00	7.00	4.38						0.00	0.00	0.00
23.	Cottage cheese								0.00	0.00	0.00		30.00				30.00	15.75	11.70
24.	Milk								0.00	0.00	0.00					80.00	80.00	6.60	4.43
25.	Salt	2.00	2.00	1.50			1.00	1.50	8.00	8.80	1.92	2.00	2.00				4.00	4.40	0.96
26.	Cumin seeds (dry whole)	1.00		1.00			1.00		3.00	2.10	1.53	1.50	0.70				2.20	1.54	1.12
27.	Turmeric (dry powder)	0.50	1.00						1.50	0.60	0.53	1.00	0.90				1.90	0.76	0.67
28.	Bay leaf	0.60							0.60	0.29	0.24						0.00	0.00	0.00
29.	Black pepper (dry powder)			0.20				0.50	0.70	1.12	0.98						0.00	0.00	0.00
30.	Coriander seeds (dry whole)	1.00							1.00	0.45	0.31						0.00	0.00	0.00
31.	Asafetida	0.50							0.50	1.10	0.80	0.50					0.50	1.10	0.80
32.	Jaggery/Gur								0.00	0.00	0.00					15.00	15.00	2.40	1.35
33.	Almonds								0.00	0.00	0.00					5.00	5.00	9.75	7.50
34.	Raisins								0.00	0.00	0.00					5.00	5.00	4.25	4.00

Note: Prices as of February 27th, 2022

Source: Big Basket (<https://www.bigbasket.com/pc/fruits-vegetables/organic-fruits-vegetables/#!/page=2>)

Table B.2 Prices of Dish- and Ingredient-wise Organic and Conventional Food Items for Males

S. No.	Ingredient	Lunch									Dinner								
		Quantity (in g)							Price (₹/g)		Quantity (in g)						Price (₹/g)		
		Dal Maharani	Kadu Ki Saloni	JeeraRice	Chapati	Salad	Mint Raita	Coriander Chutney	Total	Organic	Conventional	Mung Dal Tadka	Paneer Bhurji	Chapati	Salad	Sorghum Kheer	Total	Organic	Conventional
1.	Rice			30.00					30.00	4.80	2.97						0.00	0.00	0.00
2.	Wheat flour				30.00				30.00	4.47	1.65			45.00			45.00	6.71	2.48
3.	Sorghum								0.00	0.00	0.00					20.00	20.00	7.16	6.90
4.	Moong dal (Split)								0.00	0.00	0.00	45.00					45.00	12.15	8.10
5.	Black urad dal (whole)	35.00							35.00	10.15	6.72						0.00	0.00	0.00
6.	Red kidney beans	10.00							10.00	2.42	2.00						0.00	0.00	0.00
7.	Pumpkin		70.00						70.00	3.43	2.45						0.00	0.00	0.00
8.	Tomato	30.00	20.00			25.00			75.00	1.88	1.22	20.00	25.00		50.00		95.00	2.38	1.54
9.	Onion	30.00	20.00					10.00	60.00	4.50	3.60	20.00	25.00		25.00		70.00	5.25	4.20
10.	Garlic	5.00							5.00	0.63	0.56	5.00					5.00	0.63	0.56
11.	Ginger	5.00							5.00	0.31	0.22	5.00					5.00	0.31	0.22
12.	Green chillies	5.00	5.00					10.00	20.00	3.60	2.88	5.00	5.00				10.00	1.80	1.44
13.	Coriander leaves							20.00	20.00	1.50	1.13						0.00	0.00	0.00
14.	Mint leaves	5.00					5.00		10.00	1.00	0.88						0.00	0.00	0.00
15.	Carrot					50.00			50.00	7.50	5.63						0.00	0.00	0.00
16.	Beetroot					25.00			25.00	1.87	1.53						0.00	0.00	0.00
17.	Cucumber					50.00			50.00	2.00	1.20				50.00		50.00	2.00	1.20
18.	Lemon					5.00			5.00	1.65	1.08						0.00	0.00	0.00
19.	Butter (white)				5.00				5.00	5.54	2.45			10.00			10.00	11.08	4.90

S. No.	Ingredient	Dal Maharani	Kadu Ki Saloni	JeeraRice	Chapati	Salad	Mint Raita	Coriander Chutney	Total	Organic	Conventional	Mung Dal Tadka	Paneer Bhurji	Chapati	Salad	Sorghum Kheer	Total	Organic	Conventional
20.	Ghee			5.00					5.00	6.88	5.63						0.00	0.00	0.00
21.	Mustard oil	10.00	6.00						16.00	6.94	3.82	7.50	7.50				15.00	6.51	3.58
22.	Curd						35.00		35.00	7.00	4.38						0.00	0.00	0.00
23.	Cottage cheese								0.00	0.00	0.00		45.00				45.00	23.63	17.55
24.	Milk								0.00	0.00	0.00					80.00	80.00	6.60	4.43
25.	Salt	2.50	1.50	1.50			1.00	1.50	8.00	8.80	1.92	2.50	2.50				5.00	5.50	1.20
26.	Cumin seeds (dry whole)	1.00		1.00			1.42		3.42	2.39	1.74	1.50	1.00				2.50	1.75	1.28
27.	Turmeric (dry powder)	0.50	1.00						1.50	0.60	0.53	1.00	1.00				2.00	0.80	0.70
28.	Bay leaf	0.60							0.60	0.29	0.24						0.00	0.00	0.00
29.	Black pepper (dry powder)			0.20				0.50	0.70	1.12	0.98						0.00	0.00	0.00
30.	Coriander seeds (dry whole)	1.00							1.00	0.45	0.31						0.00	0.00	0.00
31.	Asafetida	0.50							0.50	1.10	0.80	0.50					0.50	1.10	0.80
32.	Jaggery/Gur								0.00	0.00	0.00					15.00	15.00	2.40	1.35
33.	Almonds								0.00	0.00	0.00					5.00	5.00	9.75	7.50
34.	Raisins								0.00	0.00	0.00					5.00	5.00	4.25	4.00

Note: Prices as of February 27th, 2022

Source: Big Basket (<https://www.bigbasket.com/pc/fruits-vegetables/organic-fruits-vegetables/#!page=2>)



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