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# Fisheries Development in India: Implications for Food and Nutritional Security

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## Abstract

Sustainable transformation in the fish-based food system holds critical importance in meeting food and nutritional security, earning foreign exchange, and generating income and employment for local communities while preserving the overall health of the agroecosystem. In this context, the present study was undertaken with the objectives of examining the development in the production and domestic supply of fish in India, and to highlight its implications for domestic nutritional security. The study uses secondary data collected from various statistical sources. The study shows that the fisheries sector has witnessed structural transformation over a period of time. More than three-fourths of the total fish produced in India continues to be utilised fresh, and only about 15% is processed, mainly targeting the export market. Exports of demersal and pelagic fish are growing at 26% and 11% per year, respectively, which has implications for domestic food and nutritional security. The per capita fish consumption in India has increased over the years, albeit at a slow pace. During 2010 to 2020, at the national level, the total protein and fat supply from all food sources increased from 25.4 to 32.4 Mt and from 8.3 to 12.6 Mt, in which the share of fish had a notable increase. Consequently, the per capita supply of protein and fat from fish has increased from 0.85 to 2.35 g/day in protein and from 0.15 to 0.5 g/day in fat. The per capita supply of fish-based protein and fat is increasing over a period of time, as the supply of fish is growing above the population growth rate. However, the global data indicate that compared to several Asian neighbours, the fish-based nutrients in the supply of animal-based protein and fat are lower in India, and there is potential to augment it. Due to the high demand, fish as a commodity may become inaccessible to several low-income consumers, unless its production is increased to meet the demand. This necessitates strategies to enhance production through sustainable intensification supported by appropriate technologies, institutional frameworks, and enabling policies, while maintaining ecosystem health.

**Key words:** Demand for fish, nutritional security, fish export, sustainable fisheries, food systems, small scale fisheries

## Introduction

Enhancing food production while maintaining environmental sustainability is key to providing adequate food and nutrition for an ever-increasing population of the world. This is critical to meet the first and second Sustainable Development Goals (SDGs) of the United Nations (Pradhan, Costa, Rybski, Lucht, & Kropp, 2017). According to recent estimates, the world's population, which is currently 7.6 billion, will probably increase by another one billion by 2030 and will reach 9.8 billion by 2050 (UN DESA, 2017; Bennett et al., 2018). The world has seen substantial progress in reducing hunger in this century, but millions still lack adequate access to nutritious food. Malnutrition is on the rise globally, in the form of both nutritional deficiencies and overconsumption of foods. In 2020, an estimated nearly 9% of the world population was undernourished, compared with 8% in 2019 (World Bank, 2023). The 2023 Global Hunger Index score is 18.3, and international food security and nutrition experts predict that without innovation and bold action, global hunger will continue into the next decade. The fisheries sector plays an important role in this regard.

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The 2030 Sustainable Development Goal 2 agenda aim to end hunger, attain food security, and improve nutrition (McGuire, 2015). There is a gradual change in the focus of the nutrition approach towards finer nutrient consumption, for example, micronutrients. World Health Organisation (WHO), Food and Agriculture Organisation (FAO), and the UN are paying greater attention towards micronutrient deficiencies (IFPRI, 2014). This approach is followed by several countries as well. The localised and decentralised approaches towards food and nutritional security are also emerging and have found success, particularly during crises, as in the case of COVID (Béné et al., 2016).

The economic growth in India has helped to reduce poverty over a period of time. During the 15 years between 2005-06 and 2019-21, an estimated 415 million persons exited poverty in India, according to the United Nations (UNDP, 2023). However, the fruits of economic growth have percolated rather slowly to the masses. Poverty and food insecurity in India are still areas of concern. In the 2023 Global Hunger Index, India ranks 111$^{th}$ out of 125 countries with a score of 28.7, indicating a severe level of hunger (Global Hunger Index, 2023). The number of undernourished people in the country has been gradually increasing over the years. For instance, in 2020, nearly 16% of the country's population was undernourished (World Bank, 2023). According to the latest statistics from the Government of India, 30% of children under five years of age are stunted, 18.5% are wasted, and 27.3% are underweight. Undernutrition is also widespread among adults, with 53.8% of women and 20.4% of men between 15 and 49 years of age suffering from anaemia (GOI, 2021). The food and nutritional security concern gets intensified in the context of a growing population and climate change. Fish and other aquatic animals contribute significantly towards the food and nutritional security in many developing countries of Asia and Africa, where a large number of people are poor and undernourished (Kent, 1987; Belton & Thilsted, 2014; Bennett et al., 2018). Other than market participation, many consumers harvest fish from the common property water resources, particularly with regard to small indigenous fish. Fish is a rich source of several nutrients, including protein, fatty acids, and essential micronutrients, which can help combat malnutrition and support a healthy weight and body composition (Tacon & Metian, 2013; HLPE, 2014; Bennett et al., 2018). In low-income countries, fish happens to be the cheapest and most frequently consumed animal source of protein and fatty acids (World Bank, 2006; Fanzo, Hunter, Borelli, & Mattei, 2013). Thus, fish contributes to the diversity of the food basket of the poor, which otherwise is dominated by carbohydrate-rich foods like cereals (Thilsted, 2013). Further, seafood contributes to poverty alleviation, where poor people rely heavily on seafood-based activities for livelihoods and employment. This is true of the global South (Cojocaru et al., 2022). Fish and fisheries also contribute to food security through the income pathway. Developing countries account for the largest share of global employment in primary seafood production, engaging about 59 million people. Fish and fishery resources are important in ensuring food security, employment, and sustainability in fish-rich countries (Filipski & Belton, 2018; Cojocaru et al., 2022).

The fisheries sector holds high potential to enable India to meet its future food and nutritional security. This is mainly on account of the vast maritime fishery resources of India (GOI, 2020). The fishing and aquaculture sector has emerged as the fastest-growing sub-sector in the agriculture sector during the past decade (2011-12 to 2020-21) with a trend growth rate in GVA of 8.9% year. It has been acknowledged as a potent source of revenue and employment, as it encourages the expansion of other related sectors (NABARD, 2018). In this background, the paper investigates the transformation of the fisheries sector in India and its food and nutritional security implications. The objective is undertaken in two broader themes: (a) to examine the development in production and domestic supply of fish in India, and (b) its implications on food and nutritional security.

## Materials and Methods

The study was based on secondary data collected from published national and international sources. Data on fish production and its domestic supply at national and state levels were collected from the Handbook of Fisheries Statistics of the Ministry of Fisheries, Animal Husbandry and Dairying of GoI and FAOSTAT of the Food and Agriculture Organisation (FAO). The trend in the supply of fish-based nutrients is collected from the Fishstat J Software of FAO. The trend in the prices of fish was collected from the Economic Advisor, Ministry of Commerce, Government of India. Trend growth rates based on the semi-log growth model were used

to examine the growth parameters (Gujarati, 2002). The nutritional security was analysed in terms of the availability of protein and fat.

## Results and Discussion

India's fish production has transformed, becoming second in global production, just after China. From 1980 to 2020, global production increased from 111 million tonnes (Mt) per year to 178 Mt, while India's production increased from 2.7 Mt to 14.2 Mt during the period, pushing its share from 2.4% to 7.9%. During the period, India's share in global marine fish production has increased from 1.69 Mt to 3.71 Mt, and that of inland capture fisheries has increased from 0.50 Mt to 1.80 Mt. Thus, India accounts for 5% and 16% of global production under marine and inland capture fisheries, respectively. With a production of 8.6 Mt in 2020, India accounts for 7% of global aquaculture production. India's fish production has transformed in such a way that the inland fish production has overtaken the marine-based capture fish production. Inland fish production was about 0.9 Mt in 1980 (36% of total fish production), but has increased to 11.2 Mt in 2020-21 (75% of total fish production) (Table 1). This is mainly on account of the high growth rate in aquaculture. Fig. 1 illustrates the decadal moving growth trends in inland, marine, and total fish production since 1990. In the early 1990s, fish production growth rates averaged 4–5% per year, but later diverged, leading to a widening gap between inland and marine production systems. Capture-based marine fish production has stagnated due to sustainability challenges arising from over-capitalization of marine waters, climate change, and sea-based developmental activities, among other factors (Pillai & Ganga, 2010; Suresh, Sajesh, & Samuel, 2020). However, the growth performance of India's aquaculture sector remains comparatively lower than that of other major aquaculture-producing countries in Asia, such as China, Indonesia, Thailand, and Vietnam. These countries have advanced due to the concerted efforts in expanding aquaculture, and technological and institutional interventions brought towards that direction (Suresh, Panda, & Chandrasekar, 2023).

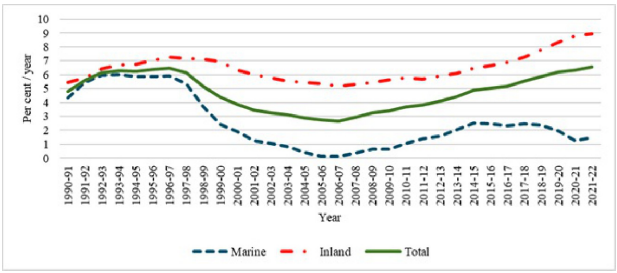


Fig. 1. Percentage growth of fish production in India (10-year moving average)

Major fish utilization methods include marketing fish in fresh form and processing through freezing, curing, canning, and reduction (Table 2). As of 2020–21, more than 77% of fish was marketed in fresh form, 13.5% in frozen form, 2.9% as cured products,

Table 1. Level and trend growth in fish production in India

| Year | Marine (Million Tonnes) | Inland (Million Tonnes) | Total (Million Tonnes) |
|---|---|---|---|
| 1980-81 | 15.55 | 8.87 | 24.42 |
| 1990-91 | 23.00 | 15.36 | 38.36 |
| 2000-01 | 28.11 | 28.45 | 56.56 |
| 2010-11 | 32.50 | 49.81 | 82.31 |
| 2020-21 | 34.76 | 112.49 | 147.25 |
| | Growth rate (%/ year) | | |
| 1980-1990 | 4.35 | 5.43 | 4.78 |
| 1990-2000 | 1.89 | 6.32 | 3.87 |
| 2000-2010 | 1.05 | 5.78 | 3.68 |
| 2010-2020 | 1.25 | 8.81 | 6.34 |
| 1980-2020 (overall) | 2.29 | 6.34 | 4.48 |

*Data Source: GoI, 2022*

Table 2. Trends in utilisation pattern of fish in India from 1991-92 to 2020-21 (In Lakh tonnes)

| Year | Marketing Fresh | Frozen | Curing | Canning | Reduction | Miscellaneous | Offal for reduction | Unspecified | Others | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| 1991-92 | 27.06 (66.96) | 2.65 (6.56) | 6.13 (15.17) | 0.30 (0.74) | 3.33 (8.24) | 0.47 (1.16) | 0.47 (1.16) | 0.00 (0.00) | 0.00 (0.00) | 40.41 (100.00) |
| 2001-02 | 47.77 (80.61) | 2.64 (4.45) | 3.46 (5.84) | 0.53 (0.89) | 3.08 (5.2) | 0.16 (0.27) | 0.43 (0.73) | 0.72 (1.21) | 0.47 (0.79) | 59.26 (100.00) |
| 2009-10* | 59.55 (82.85) | 4.35 (6.05) | 3.47 (4.83) | 0.33 (0.45) | 2.91 (4.05) | 0.61 (0.85) | 0.00 (0.00) | 0.19 (0.26) | 0.47 (0.65) | 71.88 (100.00) |
| 2020-21 | 105.64 (77.06) | 18.49 (13.49) | 3.92 (2.86) | 0.45 (0.33) | 3.08 (2.25) | 3.27 (2.39) | 0.10 (0.07) | 0.01 (0.01) | 2.12 (1.55) | 137.00 (100.00) |
| Growth rate 1991-2020 (%) | 2.90 | 5.97 | -0.36 | 0.50 | -0.07 | - | - | - | - | 2.39 |

Data Source: GoI, Handbook of Fisheries Statistics (various issues)
*The year 2009-10 was included instead of 2010-11, as the year 2010-11 has some suspected statistical issues.
Figures in parentheses indicate the percentage share of each utilization category in the total fish production.

and only 0.3% as canned fish. All other activities together accounted for less than 10%, clearly indicating that the value addition in fish is quite low. The frozen fish is mainly exported. Fish being highly perishable in nature, steps to prevent post-harvest loss and spoilage are of critical importance. Over a period of time, the share of frozen fish has increased- from 5.6% in 1991-92 to 13.5% in 2020-21. The share of all other fish utilization methods, except canning, has either declined or remained stagnant. The low level of value addition remains a major challenge for the Indian fisheries sector. The sector requires diversification to achieve higher levels of value addition. Targeting niche markets and utilizing secondary products such as nutraceuticals could serve as potential strategies.

The domestic supply was estimated by adding the net exports of fish (exports minus imports) to domestic production, after adjusting for stock changes. It is also adjusted for the quantity of fish diverted to non-human consumption. The analysis uses data up to 2019 only, as production figures for the subsequent period were significantly influenced by the COVID-19 pandemic. As of 2019, out of the total production of 13.3 Mt of fish, 1.7 Mt (12.7%) was exported (Table 3). The fish import was quite low, amounting to only 0.13 Mt. The domestic fish supply was about 11.02 Mt, showing that only about 82% of total production is available for domestic consumption. During 1980-2020, all components of the domestic supply, including production, export and import, have increased. The rate of growth in export was higher than that in production: 7.8% per year in export compared to 4.32% in production.

The trend growth in the production, export, import, and domestic supply varied across typologies of fish (Table 3). FAO reports the data under the categories of cephalopods, crustaceans, demersal fish, freshwater fish, marine fish, and pelagic fish. This research continues to use the same classification even though this classification has some obvious limitations in terms of exclusivity and overlapping, as this is a widely accepted global dataset. In the year 2020, cephalopods accounted for about 1.6% of total production, but 11% of total export, and only 0.3% of total domestic supply. The crustaceans (prawns and shrimps) accounted for about 10% of production, but 43% of total export, 7.6% of total import and only 4.7% of total domestic supply. The freshwater fish accounts for about 66% of the total domestic supply, and its share in the total exports is about 2%. The pelagic and demersal marine fishes account for about 10% each of total production, but account for more than 22% of total exports. Thus, crustaceans, along with both demersal and pelagic marine fishes, together account for more than 80% of total exports. The pelagic fishes like mackerel, sardine and anchovies constitute the major fishes consumed in the coastal areas, and hence for their food and nutritional security. Freshwater fish of

Table 3. Trend in production, export, import and domestic supply (000 tonnes) of fish, across species

| Particulars | Year | 1980 | 1990 | 2000 | 2010 | 2019 | Growth rate (%/ year) | Share (%) |
|---|---|---|---|---|---|---|---|---|
| Cephalopods | Production | 12 | 31 | 96 | 110 | 218 | 6.6 | 1.6 |
| | Export | 4 | 29 | 53 | 110 | 189 | 9.8 | 13.9 |
| | Import | 0 | 0 | 1 | 2 | 1 | 11 | 1.5 |
| | Domestic Supply | 9 | 2 | 29 | 3 | 3.9 | -1 | 0.03 |
| Crustaceans | Production | 269 | 273 | 496 | 503 | 1281 | 4.5 | 9.7 |
| | Export | 70 | 85 | 141 | 273 | 730 | 6 | 53.7 |
| | Import | 1 | 0 | 0 | 1 | 5 | 19 | 7.5 |
| | Domestic Supply | 200 | 188 | 355 | 231 | 556 | 3.6 | 4.7 |
| Demersal Fish | Production | 541 | 737 | 951 | 1020 | 1405 | 2.3 | 10.6 |
| | Export | 0 | 0 | 88 | 191 | 256 | 25.9 | 18.8 |
| | Import | 0 | 0 | 0 | 0 | 3 | 22 | 4.5 |
| | Domestic Supply | 541 | 736 | 863 | 829 | 1152 | 1.5 | 9.7 |
| Freshwater fish | Production | 912 | 1602 | 2742 | 5074 | 8616 | 5.6 | 65.0 |
| | Export | 0 | 0 | 17 | 18 | 32 | 24 | 2.4 |
| | Import | 0 | 0 | 4 | 6 | 42 | 15 | 62.7 |
| | Domestic Supply | 912 | 1602 | 2729 | 5062 | 8626 | 5.7 | 72.3 |
| Marine fish | Production | 163 | 333 | 554 | 671 | 268 | 0.8 | 2 |
| | Export | 11 | 38 | 183 | 157 | 13 | 2.0 | 1 |
| | Import | 0 | 0 | 0 | 12 | 8 | 31.6 | 11.9 |
| | Domestic Supply | 148 | 295 | 371 | 527 | 262 | 1.4 | 2.2 |
| Pelagic fish | Production | 544 | 823 | 761 | 1022 | 1328 | 2.4 | 10.0 |
| | Export | 26 | 4 | 31 | 161 | 120 | 8.71 | 8.8 |
| | Import | 0 | 1 | 29 | 17 | 7.2 | 31 | 10.7 |
| | Domestic Supply | 518 | 819 | 759 | 878 | 1215 | 2 | 10.2 |
| Aquatic animals | Production | 3 | 0.17 | 5 | 2 | 1.5 | -2.4 | 0.0 |
| (Not included | Export | 0.1 | 0.15 | 5 | 2 | 1.5 | 14 | 0.1 |
| elsewhere) | Import | 0 | 0 | 0 | 0 | 0.1 | 1.9 | 0.1 |
| | Domestic Supply | 3 | 0.02 | 0.1 | 0.2 | 0.1 | -3.9 | 0.001 |
| Molluscs excl. | Production | 0 | 1 | 3.4 | 72 | 137 | 22 | 1 |
| cephalopods | Export | 0 | 1 | 0.1 | 22 | 18 | 8.7 | 1.3 |
| | Import | 0 | 0 | 0.03 | 0.23 | 0.3 | 6.6 | 0.4 |
| | Domestic Supply | 0 | 0 | 3.3 | 50 | 119 | 26 | 1.0 |
| Total | Production | 2444 | 3800 | 5609 | 8474 | 13255 | 4.3 | 100 |
| | Export | 111 | 158 | 518 | 934 | 1360 | 7.4 | 100 |
| | Import | 1 | 1 | 34 | 38 | 67 | 21 | 100 |
| | Domestic Supply | 2331 | 3642 | 5109 | 7580 | 11934 | 4.2 | 100 |

Data Source: FAOSTAT

Note: The trend growth rate was calculated for the period of 1980 to 2019 using semi-log growth model.

India, which are commercially important, are in high demand in the domestic market. Freshwater fish are not exported to a significant level.

The value of marine products exported from India increased manyfold during 1995 to 2021 to touch US $ 7.76 billion. More than half (51%) of India's fish exports in 2020–21 consisted of frozen prawns, followed by frozen fish (16%), dried fish (7%), frozen squid (5.3%), frozen cuttlefish (5.2%), chilled products (2%), and live items (0.4%) (MPEDA, 2022). Technological advancements in the value chain, along with favourable investment and promotion policies, have driven this trend in production, processing, packing, quality assurance, and transportation (Suresh et al., 2023). These elements have also aided in the development of complex supply chains, in which products more frequently pass through many international boundaries. Increased international trade in fishery products will help the transition to sustainable fisheries since it promotes sustainable production and utilisation (Bellman, Tipping, & Sumaila, 2016). Better integration with the world markets has helped to equip Indian processing firms with a modern quality assurance system.

Fish consumption has deep historical roots in the country, with archaeological evidence dating back to 2500 BCE. As food, fish had considerable commercial value in ancient times. Today, fish remains a cornerstone of Indian cuisine, embodying the country's culinary heritage and offering people a nutritious and affordable food source. In addition to being an important protein source, fish provides essential omega-3 fatty acids and unique bioavailable micronutrients (Padiyar et al., 2024). Various agencies provide data on the consumption of fish in India. This includes the Consumption Expenditure Survey of the National Statistical Office (NSO) of the Ministry of Statistics and Programme Implementation, National Family Health Surveys (NFHS) and research organisations like National Council for Applied Economics Research (NCAER). There is wide variation in both the methodologies and the purposes of data collection. This limits the direct comparability among the consumption figures provided by different data sets. The dataset provided by the NSO is widely used for analysing the consumption of food commodities and for estimating poverty levels in India based on calorie intake. In view of its wider acceptability and utility, we rely largely on the estimates of the NSO for analysing the trend in fish consumption and the rural-urban divide. The NFHS-5 reveals that nearly three-quarters of the population ate fish. Annual per capita fish consumption in India increased signifi-

Table 4. Trend in per capita supply of protein, fat and energy supply, across animal, plant and fish sources, 1980-2020

| Particulars | | 1980 | 1990 | 2000 | 2010 | 2020 |
|---|---|---|---|---|---|---|
| Per capita protein supply(g/capita/day) | Plant Products | 41.76 | 44.59 | 46.95 | 47.22 | 51.71 |
| | Animal Products | 6.57 | 8.62 | 9.66 | 11.61 | 15.53 |
| | Fish | 0.85 | 1.06 | 1.32 | 1.68 | 2.35 |
| | Total (India) | 48.33 | 53.21 | 56.61 | 58.83 | 67.24 |
| | Global | 66.73 | 70.47 | 75.04 | 79.63 | 84.57 |
| Per Capita Fat Supply (g/capita/day) | Plant Products | 25.06 | 29.02 | 33.42 | 35.06 | 40.45 |
| | Animal Products | 7.7 | 10.62 | 12.23 | 14.48 | 19.24 |
| | Fish | 0.15 | 0.20 | 0.24 | 0.35 | 0.50 |
| | Total (India) | 32.76 | 39.64 | 45.65 | 49.54 | 59.69 |
| | Global | 59.5 | 67.35 | 73.55 | 81.07 | 88.73 |
| Per Capita Energy Supply (kcal/capita/day) | Plant Products | 1878 | 2048 | 2198 | 2171 | 2306 |
| | Animal Products | 116 | 158 | 182 | 219 | 293 |
| | Fish | 5 | 6 | 8 | 10 | 15 |
| | Total (India) | 1994 | 2205 | 2380 | 2391 | 2599 |
| | Global | 2490 | 2621 | 2727 | 2858 | 2982 |

Data Source: FAOSTAT

cantly from 4.9 kg in 2005 to 8.89 kg in 2020, representing a growth of 81.4%. This notable rise highlights the growing demand for fish across the country, even among those who were already regular consumers (Padiyar et al., 2024). Among the Indian states, Lakshadweep reports the highest per capita fish consumption, followed by Goa, Tripura, and Kerala (NSO, 2023). The latest NSO (2023) and NFHS (5th round) surveys revealed minimal differences in fish consumption between rural and urban areas, with slightly higher per capita monthly consumption in urban regions (Fig. 2). Additionally, fish consumption shows variation across socio-economic classes (NSO, 2023; Padiyar et al., 2024). This trend is attributed to better availability and affordability of non-vegetarian foods in both urban and rural markets.

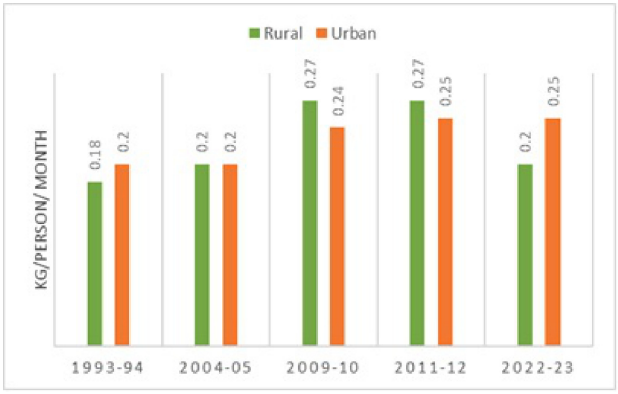


Fig. 2. Trend in fish consumption in India (1993-94 to 2022-23)

Data Source: NSSO/ NSO (Various issues)

Animal proteins, such as those found in milk, fish, meat, and eggs, are needed for a nutritionally balanced diet (Barik, 2017). Since fish is nutrient-dense and commonly available, it plays a significant role in ensuring nutritional security (Béné et al., 2016; FAO, 2018; Reksten et al., 2020). The FAOSTAT of FAO provides data on the supply of fat, protein and energy on a per capita basis. In India, the total per capita protein, fat, and energy supply increased over the period 1980–2020 from all the sources of food (Table 4). Even though the per capita nutrient supply from seafood has increased in India, its share is low, accounting for only about 15% of the total animal-based protein supply and 2.6% of the animal-based fat supply in 2020.

Data on the protein, fat and calorie supply in India from different food sources is compiled for the period of 2010 to 2020 (Table 5). During the period, the total supply of protein increased from 25.4 Mt to 32.4 Mt, at a trend growth rate of 2.5% per year. Fish accounted for about 3% of the total protein supply in 2010, but in a decade, the share increased to 3.7%. Altogether, the share of animal sources in protein supply increased from 20 to 24%, and in this, the share of fish was about 22% as of 2020. The share of fish in the fat supply has increased marginally. Thus, the per capita fish-based protein availability is only about 2.35 g/day, whereas that from total animal sources is about 15.53 g/day.

Despite increased production, India contributes only about 7.4% to the global protein supply and 7.0% to the global fat supply derived from fish (Table 6). The table also provides a comparison with China, which accounts for 31.7% and 23.9%, respectively. India's contribution to the global animal-based protein and fat supply is only about 8.5% and 5.7%, respectively, compared to 23 and 32.4%, respectively, for China. India finds its major protein and fat supply from vegetable sources. India fares well in the case of protein supply from pulses (it accounts for 33.8% in the case of global protein supply from pulses) and fat supply from oil seeds (22.6% in oil seed-based fat supply) (FAO, 2022).

Increased availability does not ensure accessibility to the fish, given the price rise and income constraints. The wholesale market has seen a significant increase in fish prices from 2011-12 to 2022-23 (base year of 2011-12), with inland and marine fish prices increasing by 70% and 78% respectively, compared to 52.8% by all commodities and 76.8% by the primary articles. This is higher for marine fish compared to egg and meat. The increase

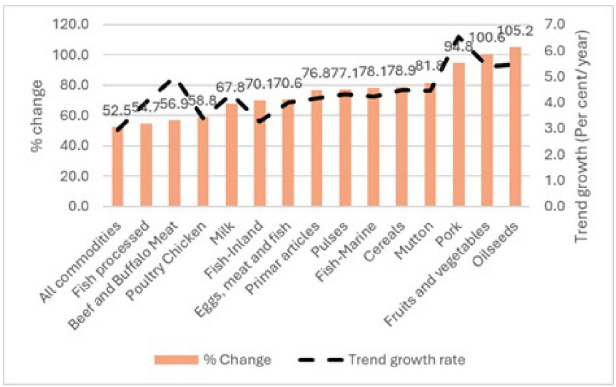


Fig. 3. Trend growth and percentage change of Wholesale Price Index (WPI), major commodity groups, 2011-12 to 2022-23

Table 5. Sources and composition of protein and fat supply in India, 2010-2020

| S. No. | Source | Protein Supply | | | Share in protein supply | | Fat Supply (Million Tonnes) | | | Share in fat supply | | Per Capita Supply | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2010 (Mt) | 2020 (Mt) | Growth rate (2010-20) | 2010 (%) | 2020 (%) | 2010 (Mt) | 2020 (Mt) | Growth rate (2010-20) | 2010 (%) | 2020 (%) | Protein (g/day) | Fat (g/day) | Energy (Kcal day) |
| 1 | Fish | 0.8 | 1.2 | 5.3 | 3.0 | 3.7 | 0.2 | 0.3 | 5.6 | 1.9 | 2.0 | 2.35 | 0.5 | 15 |
| 2 | Meat | 0.7 | 0.8 | 3.5 | 2.6 | 2.5 | 0.5 | 0.6 | 3.1 | 6.2 | 4.9 | 1.59 | 1.22 | 18 |
| 3 | Egg | 0.3 | 0.6 | 6.9 | 1.2 | 1.8 | 0.3 | 0.5 | 6.9 | 3.4 | 4.2 | 1.15 | 1.05 | 15 |
| 4 | Milk | 3.4 | 5.2 | 5.0 | 13.5 | 16.0 | 2.3 | 3.6 | 5.7 | 27.6 | 28.8 | 10.3 | 7.19 | 163 |
| 5 | Animal source (1+2+3+4) | 5.1 | 7.8 | 5.0 | 20.3 | 24.0 | 3.2 | 5.0 | 5.5 | 39.2 | 39.9 | 15.53 | 19.24 | 293 |
| 6 | Cereals | 14.8 | 16.9 | 1.1 | 58.2 | 52.3 | 2.6 | 2.9 | 0.9 | 32.0 | 23.3 | 33.61 | 5.82 | 1401 |
| 7 | Pulses | 3.4 | 4.1 | 2.4 | 13.6 | 12.7 | 0.5 | 0.6 | 2.1 | 5.8 | 4.6 | 8.16 | 1.15 | 139 |
| 8 | Oil crops/veg oil | 0.4 | 1.4 | 9.9 | 1.7 | 4.2 | 1.5 | 3.5 | 7.6 | 18.6 | 28.0 | 2.68 | 30.72 | 290 |
| 9 | Vegetables | 1.2 | 1.7 | 3.4 | 4.8 | 5.4 | 0.2 | 0.3 | 3.3 | 2.2 | 2.1 | 3.45 | 0.51 | 66 |
| 10 | Fruits | 0.4 | 0.5 | 3.1 | 1.5 | 1.5 | 0.2 | 0.3 | 3.8 | 2.3 | 2.1 | 0.94 | 0.52 | 78 |
| 11 | Plant source (6+7+8+9+10) | 20.2 | 24.6 | 1.8 | 79.8 | 76.0 | 5.0 | 7.5 | 3.6 | 60.9 | 60.0 | 51.71 | 40.45 | 2306 |
| 12 | Total | 25.4 | 32.4 | 2.5 | 100.0 | 100.0 | 8.3 | 12.6 | 4.4 | 100.0 | 100.0 | 67.24 | 59.69 | 2982 |

Data Source: FAOSTAT,2022

in price renders fish inaccessible to several consumers.

India's fisheries sector has undergone a major structural transformation from marine capture to inland aquaculture, making the country the world's second-largest fish producer. This shift has strengthened domestic supply and boosted exports, particularly of high-value crustaceans, while creating employment opportunities and earning valuable foreign exchange. However, the export orientation of nutrient-rich marine species, coupled with rising prices, poses challenges to equitable domestic access, especially in coastal regions where pelagic and demersal fishes are dietary staples. Fish consumption in India has risen steadily, with a growing share of the population incorporating it into their diets. There is an increase in per capita supplies of protein and fat, outpacing the growth from other animal sources. However, amid persistent undernutrition reflected in high rates of child stunting and anaemia, India's nutrient intake from fish remains modest compared to other Asian countries. This underscores the need for greater dietary diversification beyond cereal-dominant consumption patterns. Fish has a significant role in the dietary diversification and supply of essential nutrients.

This transformation aligns with Sustainable Development Goal 2 (Zero Hunger) by leveraging the nutrient density of fish, which are rich in high-quality protein, omega-3 fatty acids, and bioavailable micronutrients, to combat malnutrition. Over the years, the per capita fish consumption and fish supply in the domestic market have increased steadily. However, the potential of the fisheries sector in addressing nutritional security remains untapped. India's share in fish-based protein and fat supply is only 7%. Realizing the sector's full potential within the blue economy framework requires balancing export priorities with domestic nutritional needs, promoting sustainable and inclusive aquaculture, empowering coastal communities, and integrating fish into national nutrition and social welfare programs. Strengthened data systems, technological innovations, and climate-resilient strategies will be essential to ensure that fisheries continue to support food security, equity, and ecological sustainability.

Table 6. Quantity of protein and fat supplied by various sources across the globe in 2020 (Mt)

| Source/ Country | | India | China | World | Share (% to the World) | |
|---|---|---|---|---|---|---|
| | | | | | India | China |
| Meat | Protein | 0.8 | 10.67 | 41.12 | 1.95 | 25.95 |
| | Fat | 0.61 | 22.68 | 53.63 | 1.14 | 42.29 |
| Egg | Protein | 0.58 | 3.65 | 8.98 | 6.46 | 40.65 |
| | Fat | 0.53 | 3.33 | 8.11 | 6.54 | 41.06 |
| Milk | Protein | 5.19 | 1.6 | 25.26 | 20.55 | 6.33 |
| | Fat | 3.62 | 1.65 | 22.49 | 16.10 | 7.34 |
| Fish | Protein | 1.18 | 5.05 | 15.95 | 7.40 | 31.66 |
| | Fat | 0.25 | 0.85 | 3.55 | 7.04 | 23.94 |
| Animal source | Protein | 7.75 | 20.98 | 91.31 | 8.49 | 22.98 |
| (1+2+3+4) | Fat | 5.01 | 28.51 | 87.78 | 5.71 | 32.48 |
| Cereals | Protein | 16.93 | 19.28 | 92.03 | 18.40 | 20.95 |
| | Fat | 2.93 | 3.41 | 17.39 | 16.85 | 19.61 |
| Pulses | Protein | 4.11 | 0.49 | 12.17 | 33.77 | 4.03 |
| | Fat | 0.58 | 0.04 | 1.25 | 46.40 | 3.20 |
| Oil crops | Protein | 1.35 | 4.38 | 9.6 | 14.06 | 45.63 |
| | Fat | 3.51 | 4.48 | 15.51 | 22.63 | 28.88 |
| Vegetables | Protein | 1.74 | 7.57 | 14.26 | 12.20 | 53.09 |
| | Fat | 0.26 | 1.24 | 2.39 | 10.88 | 51.88 |
| Fruits | Protein | 0.47 | 0.69 | 3.43 | 13.70 | 20.12 |
| | Fat | 0.26 | 0.34 | 2.11 | 12.32 | 16.11 |
| Plant source | Protein | 24.6 | 32.4 | 131.49 | 18.71 | 24.64 |
| (6+7+8+9+10) | Fat | 7.54 | 9.51 | 38.66 | 19.50 | 24.60 |
| Total | Protein | 32.35 | 53.38 | 222.8 | 14.52 | 23.96 |
| | Fat | 12.56 | 38.03 | 126.44 | 9.93 | 30.08 |

Data Source: FAOSTAT, 2022

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