

Delivering Affordable Nutrition Security through Fish: Evidence from a Rural Village in Telangana

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ABSTRACT

The study explores the role of fish consumption in addressing nutrition security and malnutrition in a rural village in Telangana, India. It highlights that fish, particularly small indigenous species, provide affordable, high-quality protein and micronutrients. The study compares fish with other protein sources like poultry and livestock, finding that fish consumption significantly meets the nutritional needs of the rural population more effectively than other animal sources. India, despite being the third-largest fish producer globally, still faces challenges with malnutrition, especially among children and women. National Family Health Survey (NFHS) reports show alarming rates of stunting, wasting, and anemia, particularly in Telangana. The study demonstrates how increased fish consumption can play a crucial role in reducing these malnutrition rates by offering a cost-effective and nutrient-dense food source. The state government has encouraged fish production in Telangana through subsidies and initiatives like Pradhan Mantri Matsya Sampada Yojana. However, the research suggests that the fish distribution infrastructure needs significant improvement to increase access to fish for the broader population. The paper concludes that promoting fish consumption can be a viable strategy to combat malnutrition, improve food security, and provide economic opportunities for rural communities. Policy recommendations include enhancing market infrastructure, increasing fish production through scientific aquaculture, and raising awareness about the nutritional benefits of fish. These measures could ensure that fish contributes more significantly to achieving Sustainable Development Goals (SDG) related to hunger and malnutrition.

Keywords: Fisheries, Malnutrition, Telangana, Nutrition Security.

JEL codes: O13, Q18, Q22, Q57

I

INTRODUCTION

An estimated 821 million people worldwide suffer from hunger, which is rising (FAO, 2019a). According to the United Nations (UN, 2015), goal two among 17 SDGs aims to end all forms of malnutrition, improve nutrition, and end hunger. This goal highlights the importance of this global challenge. The word "malnutrition" refers to a broad range of conditions, including both excessive or insufficient nutrient consumption (overnutrition) and deficiencies in specific nutrients (micronutrient deficiency, sometimes known as "hidden hunger"; UNICEF, 2019). However, these crucial pathways are influenced by many underlying factors, including the status of the economy, gender equality, healthcare access, environmental concerns, social status, eating habits, and education (Development Initiatives, 2018). The Food and Agricultural Organization (FAO) defines food security as a combination of different causative factors in four main dimensions: food availability, access, utilization, and stability (FAO, 2006). The High-Level Panel of Experts on Food Security and Nutrition

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(HLPE, 2020) added two additional dimensions to this definition: agency and sustainability (Hasselberg et al., 2020).

In contrast, the notion of nutrition security has developed from UNICEF's conceptual framework on malnutrition (Jonsson, 1992); it acknowledges the significance of important nutrition concerns like public health, sanitation, and care and feeding practices while also incorporating the dimensions of food security (CFS, 2012). Dietary diversification, food production, and food fortification are all part of the food-based approach the FAO suggests to achieve food and nutrition security (FAO, 2011). In this context, it is generally acknowledged how important terrestrial agri-food systems are; however, the significance of fish and fisheries concerning food and nutrition security is often overlooked (Thilsted et al., 2014; Béné et al., 2015). Fish intake in low- and middle-income nations may be low in absolute terms. However, Tacon and Metian (2009) say fish may be a vital source of vitamins, animal protein, minerals, and key trace elements.

Fish plays a critical role in human nutrition, providing at least 20 per cent of the protein intake for one-third of the world's population, particularly in developing nations (Bene, Macfadyen, and Allison, 2007). Fatty fish, especially those rich in omega-3 polyunsaturated fatty acids (PUFAs), offer health-promoting oils in addition to their protein content. Small indigenous fish species (SIFs) are especially nutrient-dense, providing essential micronutrients that can help combat diseases associated with micronutrient deficiencies in developing countries (Roos, Islam, & Thilsted, 2003). This paper explores the role of fish in providing affordable nutrition compared to poultry and livestock in Narwa Village, located in Mancherial District, Telangana State. By analyzing the expenditure and nutritional benefits of fish, poultry, and livestock, the study found that fish consumption better meets dietary requirements than other animal protein sources.

Globally, plant proteins and pulses have been key contributors to protein supply. However, slow growth in pulse production has caused prices to rise, making them unaffordable for many, particularly low-income groups. As a result, alternative sources of affordable, high-quality protein are being sought. Fish provides an excellent solution, as it fulfills approximately 30 per cent of the daily protein requirement, higher than many pulses consumed in large quantities. Furthermore, fish can match or exceed the protein content of other animal-based proteins such as pork, eggs, and milk. Fish is also advantageous due to its wide range of prices, making it accessible to various socioeconomic groups.

Despite large-scale food production, 224.3 million people remain undernourished, 20 million children under five suffer from wasting, 36.1 million are stunted, and 187.3 million women are affected by anemia (FAO, 2022). Additionally, the mortality rate for children under five is 41.9 per cent (NHFS, 5). Although food production and market distribution are critical components often discussed in the literature, less attention has been given to how food reaches the consumer. There is also limited knowledge of cultural practices, social negotiations, and decision-making

processes influencing who consumes what and why. This study aims to address these gaps by investigating the role of fish consumption in improving food and nutrition security in rural areas. It also explores the challenges of accessing nutritious food and the role of the state and institutions in addressing under-nutrition. This research highlights the importance of fish as a key component in combating malnutrition and providing sustainable, affordable nutrition.

II

DATA AND METHODOLOGY

The study exclusively depends on primary data. A structured questionnaire was administered to the principal responding units. On the surface, the Comprehensive National Nutrition Survey (CNNS) (2019) Telangana and NFHS-4 and 5 were the primary data sources for the deduction strategy used for the chosen areas. According to Gummadi et al. (2021), Telangana is classified as a moderately nutritionally insecure state, meaning that 30–40 per cent of children under the age of five are stunted. Based on NFHS5, the hamlet was selected based on the average stunting, wasting, and underweight state rate. The district ranked based on the total amount thus acquired has considered the mean absolute deviation of these indicators scaled by the state average. Mancherial District's Narwa Village was selected for the study. The anthropometric evaluation method is a direct way of nutritional assessment that has been used to evaluate the nutritional outcome of adults and children and comprehend nutritional security. Using World Health Organization (WHO) growth standards for children and adults, anthropometric failures among children and BMI for adults (over the age of five) in the study area were calculated based on inputs on weight, height, and age of children (under the age of five). Information on their daily (rice, dal, vegetable, and milk) and weekly food consumption (egg/chicken/mutton/fish) was gathered to investigate the food expenditure and nutritional component through food intake. The protein and calorie intake measurement has been calculated based on the consumer expenditure schedule of the NSS 26th round.

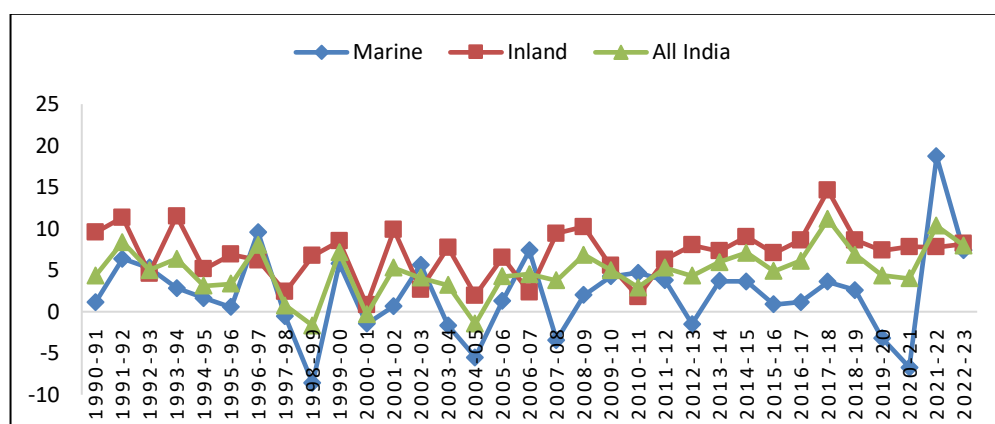
III

ROLE OF FISH IN NUTRITIONAL SECURITY IN INDIA

To understand what role fish plays in the consumption basket of rural consumers and its role in addressing food and nutrition security, we understood the fish production and consumption scenario in India. With 7.96 per cent of the world's fish produced, India is the third-largest fish-producing nation. Throughout FY 2022–2023, a projected 16.25 million tons of fish is expected to be produced, of which 4.13 million tons will be sourced from the maritime sector and 12.12 million tons from the inland sector. For the past five years, the Fisheries industry has experienced average annual growth of 7 per cent. The Fisheries sector is an important contributor to the country's economy. At constant prices, the sector is estimated to generate Rs. 1,37,716 crores in Gross Value Added (GVA) in 2022–2023, or 1.09 per cent of the GVA overall and

6.72 per cent of GVA from agriculture. For millions, fisheries and aquaculture remain a vital source of nutrition, food, income, and sustenance.

Recognizing the industry's potential, the Department of Fisheries is putting the Pradhan Mantri Matsya Sampada Yojana (PMMSY) into action to build on the successes of the Blue Revolution and give the sector targeted attention. In May 2020, the Indian government approved PMMSY with an anticipated investment of Rs. 20,050 crores, divided into three parts: the Central government's portion of Rs. 9,407 crores, the State government's share of Rs. 4,880 crores, and the beneficiary's contribution of Rs. 5,763 crores. The program will run for five years, from FY 2020–21 to FY2024–25.



Source: Handbook on Fisheries Statistics, GoI.

FIGURE 1: ANNUAL AVERAGE GROWTH RATE OF FISH PRODUCTION IN INDIA (IN PER CENT)

An appreciable amount of fish production has occurred at the national level. On the other hand, the consumption of the same is gloomy. NFHS 4 and 5 have provided information on females (aged 15-49 years) and males (aged 15-54 years) on how frequently (daily, weekly, occasionally, or never) they consume nine food groups. For this paper, we have considered seven food groups to meet the requirements of our field study. (1) Milk or curd, (2) Pulses or beans, (3) Dark green, leafy vegetables, (4) Eggs, (5) Fish, (6) Chicken or meat and (7) Fish, chicken or meat.

The percentage of men and women who consume different specific cuisines at least once a week based on their socioeconomic status is shown in Tables 1 and 2. More than (90 per cent) of women in all categories consume dark green, leafy vegetables and pulses or beans. More than 50 per cent of females consume milk or curd. The consumption of eggs is below 50 per cent, and fish is below 40 per cent, chicken is mildly higher than fish consumption. Very few women eat eggs, meat, fish, or chicken daily. The majority of the females are consuming vegetarian food rather than non-vegetarian food. However, SC and ST female consumption is low in the food basket when compared with other higher social groups, and also rural females' consumption

is less than urban female's consumption. Fish consumption is around 50 per cent per week, and chicken/meat is around 60 per cent. SC and ST male consumption is low in the food basket per week compared to other higher social groups, and rural male consumption is less than urban male consumption.

It is also observed from Tables 1 and 2 that fish consumption among males and females is increasing from 2015-16 to 2019-21. In urban and rural locations, across all religions and all caste groups, the proportion of people who consume fish at least once a week has climbed by 5 per cent for men and 2 per cent for women. Inter-religious differences exist in fish consumption in urban areas. Christian males' consumption is higher (65 per cent) than Hindu (42 per cent) and Muslim (63.4 per cent) males' consumption of fish once per week. In females, 63 per cent of Christian females consume fish once per week, whereas 32 per cent and 54 per cent of Hindu and Muslim females consume fish once per week. Interestingly, SC males consume more fish (48 per cent) once a week than other social groups' males (45 per cent).

TABLE 1: PERCENTAGE OF WOMEN AGE 15-49 CONSUMING SPECIFIC FOODS AT LEAST ONCE A WEEK BY BACKGROUND CHARACTERISTICS – NFHS 4 AND 5

Specific foods	Milk or curd		Pulses or beans		Dark green, leafy vegetables		Eggs		Fish		Chicken or meat		Fish, chicken, or meat	
	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
S 4 & 5	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	S 4	HS
Col.No	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Age Group													
15-19	65	69.8	88.9	91.9	83.4	89.4	39	43.1	31.1	32.8	30.4	33.7	39.6	42.1
20-29	69	72.6	90.3	93.1	85.9	91.3	42.8	46	34.1	35.7	33.6	36.8	43.4	45.4
30-39	68.3	72.4	90.2	93.3	86.1	91.1	42.2	46	35.1	36.8	33.3	36.7	43.8	46.2
40-49	68.3	73.3	89.8	93	85.7	90.7	40	44.2	34.9	36.5	31.6	35.4	43.2	45.7
	Residence													
Urban	76.2	78.8	91.8	94.2	87.3	91.3	47.8	51.9	37.8	38.9	40.4	42.4	49.2	50.8
Rural	63.6	69.1	88.9	92.3	84.5	90.6	37.9	41.8	32	34.2	28.4	32.8	39.4	42.4
	Religion													
Hindu	68.8	72.9	90.1	93.3	85.7	91.2	38	41.5	31	32.4	28.6	32	38.3	40.7
Muslim	62.3	68.2	89.6	91.9	84	89.5	59.7	65.6	50.6	54.4	54.9	58.1	67.3	70.2
Christian	65.8	69.6	84.6	86.9	82.4	81.8	64.7	70.9	60.1	63.2	54.2	61.6	74.3	78
	Caste/Social group													
SC	62.9	68.7	88.7	92.2	85.2	90.6	44.5	48.4	35.8	37.4	33.2	37.7	44.8	47.7
ST	50.1	54.9	86	90.3	85.5	91	42.4	46.4	34.3	36	33.2	37.1	43.1	46
OBC	71.2	76.5	90	93.6	84	90.2	38.3	42.7	30.3	32.4	30.9	33.7	39.3	42
Other	72.9	74.9	92	93.5	88.1	91.9	43.4	45.7	38.4	39.6	34.3	37.5	46.6	47.7
Don't know	61.9	57.9	89.1	91.3	87.5	91.1	49.2	50.5	43.7	43.9	38.4	41.6	51.6	53.1

Source: International Institute for Population Sciences (IIPS) and ICF. Ministry of Health and Family Welfare (GoI). NFHS 4 (2015-16) and 5 (2019-21), India.

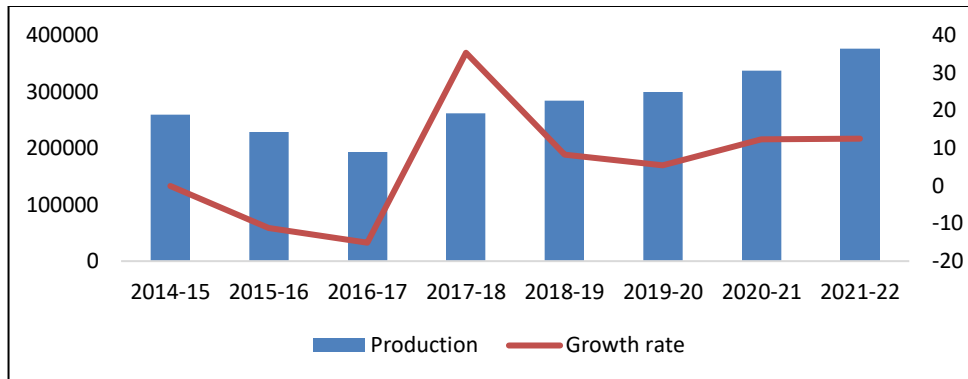
TABLE 2: PERCENTAGE OF MEN AGE 15-49 CONSUMING SPECIFIC FOODS AT LEAST ONCE A WEEK BY BACKGROUND CHARACTERISTICS – NFHS 4 AND 5

Specific foods	Milk or curd		Pulses or beans		Dark green, leafy vegetables		Eggs		Fish		Chicken or meat		sh, chicken or meat	
	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS
4 & 5	4	5	4	5	4	5	4	5	4	5	4	5	4	5
Col. No.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Age Group														
15-19	75.8	80.8	89.6	92.6	86.3	91.9	47.9	55.4	35.4	41.8	38	44.5	45.9	54.2
20-29	75.1	79.7	90.5	92.5	88	91.8	50.8	59	38.6	46.1	41.8	48.6	49.5	57.7
30-39	75	80	90.9	94	89	92.8	50	58.2	39.7	47.2	41	47.6	49.6	58.2
40-49	74.1	79	91	93.6	88.8	93	49	57.3	39.8	46.7	40.6	45.5	49.7	57.8
Residence														
Urban	80.4	85.6	91.3	94.1	88.5	93	53.8	61	40.1	46.4	46	50.8	52.8	60
Rural	71.6	76.6	90.2	92.7	87.9	92	47.1	56	37.6	45.4	37.3	44.7	46.5	55.8
Religion														
Hindu	75.7	81	90.9	93.7	88.3	92.5	46.7	54.5	36.1	42	36.9	42.8	44.8	52.5
Muslim	70.3	73.7	89	91.1	86.8	92.2	66.5	73.2	52.9	63.4	62.3	65	73.1	79.5
Christian	73.1	74.9	86.6	88.2	88.4	90.1	71.5	72.7	63.9	65	62.3	66.2	75.6	80
Caste/Social group														
SC	71.1	76.3	89.8	93.4	88.3	92.1	52.6	60.8	40.4	48.3	42.4	48.3	50.6	60.4
ST	55.8	66.7	87.3	89.8	87.3	91.3	50.6	57.1	40	45.6	41.8	50.3	50.1	58.8
OBC	78.3	84.2	90.2	94	86.8	92.3	47.4	55.6	36.7	41.8	39.2	45.8	46.7	53.7
Other	78.6	80.2	92.8	93	90.6	93	50.7	58.6	39.6	49.7	41.2	46	50.7	59.4
Don't know	72.4	68.5	90.4	89.1	82.7	93.3	60.8	73.6	59.2	64.1	51	60.2	66.4	76.4

Source: International Institute for Population Sciences (IIPS) and ICF. Ministry of Health and Family Welfare (GoI). NFHS 4 4 (2015-16) and 5 (2019-21), India.

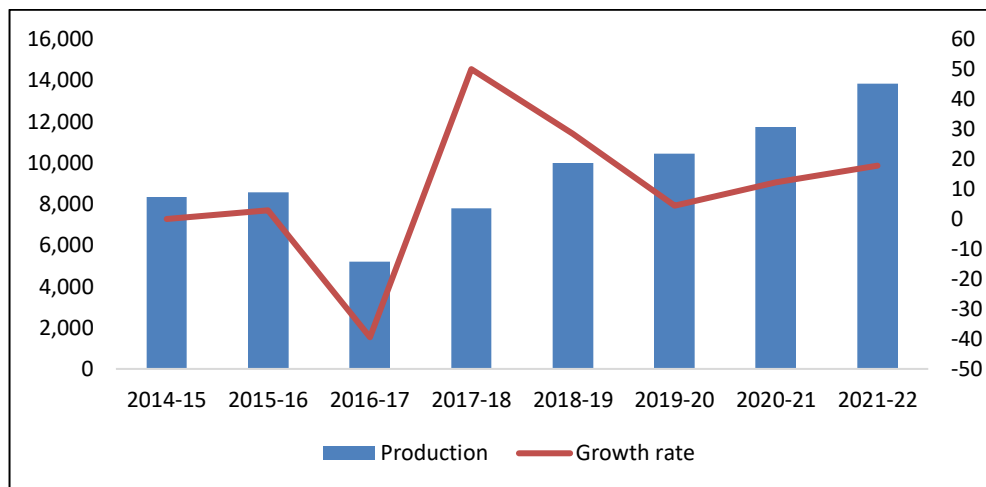
Fisheries in Telangana

The fisheries sector is one of the fastest-growing income and employment-generating sectors in the state of Telangana. Being a landlocked state, Telangana's fish production is based on inland fisheries. To further accelerate the fisheries sector, Pradhan Mantri Matsya Sampada Yojana sanctioned an outlay of Rs.5405.165 lakhs and Rs.9080.43 lakhs during 2020-21 & 2021-22 respectively (NFDB, 2021). Between 2014-15 and 2021-22, fish output increased from 2.60 lakh tonnes to 3.076 lakh tonnes, while prawn production increased from 0.083 lakh tonnes to 0.138 lakh tons (Figure 3).



Source: Department of Fisheries, States Government / UTs Administration, 2021-22

FIGURE 2: FISH PRODUCTION (IN TONNES) AND GROWTH RATE (IN %) - TELANGANA



Source: Department of Fisheries, States Government / UTs Administration, 2021-22

FIGURE 3 PRAWN PRODUCTION (IN TONNES) AND GROWTH RATE (IN %) - TELANGANA

Figures 2 and 3 show that the fish and prawn production in Telangana saw an increasing pattern after the fall in 2015-16. Telangana is a land-locked state, and marine fish have been imported from Andhra Pradesh, Tamil Nadu, and Kolkata. Catla, Rohu, and Murrel are the fish most consumed in Telangana and the selected study village.

Fisheries Sector in Mancherial District

Godavari and Pranahitha rivers flow in the Mancherial district, where the rivers stretch 147.66 Kms. and 50.99 Kms, respectively, and are prime fish sources. The fish and prawn culture has also been encouraged in the district. There are (117) fisheries and co-operative societies in the district. Inland fish and prawn production in the district during the year 2021-22 is 9987 metric tons, an estimated value of Rs. 160.60 crore rupees (Department of Fisheries, Telangana, 2022).

TABLE 3: PRODUCTION OF INLAND FISH AND PRAWN BY MANDALS IN MANCHERIAL DISTRICT, 2021-22

S. No.	Mandal Name	Fish		Prawn		Total	
		Quantity (in tonnes)	Value (in Rs.)	Quantity (in tonnes)	Value (in Rs.)	Quantity (in tonnes)	Value (in Rs.)
1.	Jannaram	830	1286.5	25	81.25	855	1367.75
2.	Dandepalle	736	1140.5	15	48.75	751	1189.25
3.	Luxettipet	870	1348.5	30	97.5	900	1446
4.	Hajipur	1150	1782.5	75	243.75	1225	2026.25
5.	Kasipet	380	589	2	6.5	382	595.5
6.	Tandur	880	1364	15	48.75	895	1412.75
7.	Bheemini	260	403	0	0	260	403
8.	Kannepalli	190	294.5	0	0	190	294.5
9.	Vemanpalle	570	883.5	36	117	606	1000.5
10.	Nennal	490	759.5	20	65	510	824.5
11.	Bellampalle	330	502	0	0	330	502
12.	Mandamarri	380	589	0	0	380	589
13.	Mancherial	290	449.5	40	130	330	579.5
14.	Nasipur	210	325.5	0	0	210	325.5
15.	Jaipur	530	820	12	39	542	859
16.	Bhimaram	790	1224.5	66	214.5	856	1439
17.	Chennur	560	868	10	32	570	900
18.	Kotapalle	190	290	5	16	195	306
	Total	9636	14920	351	1140	9987	16060

Source: District Fisheries Officer, Mancherial.

Narwa village, which falls under Jaipur Mandal, was chosen for the study. Fish production in Jaipur Mandal is higher than prawn production due to a lack of prawn hatcheries (Department of Fisheries, Govt. of Telangana, 2022), which aligns with field survey observations. However, Catla and Rohu are abundant in the mandal's reservoirs (Department of Fisheries, Govt. of Telangana, 2022).

TABLE 4: PRODUCTION OF INLAND FISH AND PRAWN BY SPECIES, 2020-21 & 2021-22

Name of the Fish Species	2020-21		2021-22	
	Quantity (in tonnes)	Value (in Rs.)	Quantity (in tonnes)	Value (in Rs.)
(1)	(2)	(3)	(4)	(5)
<i>Catla</i>	860	68.8	1840	2576
<i>Rohu</i>	1130	90.4	2008	2811
<i>Mrigala</i>	610	48.8	1050	1470
Common Carp	741	59.28	1510	2114
<i>Murrel</i>	431	150.85	663	2962
<i>Tilapia</i>	0	0	0	0
<i>Pangasius</i>	240	24	0	0
Others	1997	785.82	2565	2987
Total Fish	6009	1227.95	9636	14920
Prawn	640	1280	351	1140
Grand Total(Fish+Prawn)	6649	2507.95	9987	16060

Source: District Fisheries Officer, Mancherial.

From Table 4, it is evident that the production of major carps viz. Catla (860 – 1840 tonnes), Rohu (1130 – 2008 tonnes), Mrigala (610 – 1050 tonnes), and Murrel (431 – 663 tonnes) have seen an increased trend for a year from 2020-21 to 2021-22, whereas the production of prawns is found to be declining.

Nutritional Value of Fish Species in Mancherial

About 15–16 per cent of the protein in Indian large carps (IMCs), such as Rohu, Mrigala, and Catla, is used in aquaculture production. Regarding protein content, most fish species have more than 15 per cent, which makes up roughly 30 to 50 per cent of the daily value per cent of protein required for humans. Some fish are similar to a few pulses found in tropical nations, such as moong, lentils, pigeon pea, and other animal protein sources like lean pork and eggs. Still, fish are more affordable and readily available than other plant or animal protein sources, and they can play a significant role in helping people in developing nations meet their protein needs (Mohanty et al., 2019). Fish is rich in protein, vitamin A, Vitamin E, and essential fatty acids. Fish species like Bochu, Catla, mrigal, pran, and rohu contain 320-650 mg of Nutrient content of calcium for a 100g edible portion (NIN, 2011).

TABLE 5: GROSS CHEMICAL COMPOSITION OF MAJOR CARPS - INDIA (%)

<i>Species</i>	Catla (Catla catla)	Etroplus suratensis	Labeo rohita
<i>Habitat</i>	Freshwater	Brackishwater	Freshwater
Moisture	76.2 ± 0.3	74.2 ± 0.5	75.6 ± 0.5
Crude Protein	16.2 ± 0.5	20.4 ± 0.8	15.9 ± 0.4
Crude Fat	2.8 ± 0.3	4.7 ± 0.8	2.7 ± 0.2
Ash	2.5 ± 0.1	1.4 ± 0.1	2.6 ± 0.2

Source: Mohanty, BP et al. 2019.

TABLE 6: MICRONUTRIENTS COMPOSITION IN FISH

Micronutrients	Per 100g of edible portion
Iron (mg)	0.6
Zinc (mg)	0.6
Vitamin A (µg)	5.6
Riboflavin (mg)	0.03
Folate (µg)	15.4
Vitamin B ₁₂ (µg)	1.4

Source: NIN, 2020. Pg. 321.

Fish is a good source of Vitamin A (5.6 micrograms per 100 gms) and Vitamin B12 (1.4 micrograms per 100 gms). Folate, which is useful in the formation of red blood cells and helpful in mitigating anaemia, is about 15.4 micrograms per 100 gms of edible portion.

Malnutrition and Food Consumption in Telangana

In Telangana, the percentage of under five children who are underweight has increased from 28.4 per cent to 31.8 per cent, with 28 per cent still being stunted and 18 per cent still wasting, according to NFHS 4 and 5. In addition, the percentage of underweight children has climbed from 33 per cent to 35 per cent in rural regions, the percentage of stunted children has increased from 21 per cent to 28 per cent, and the percentage of wasted children has increased from 15 per cent to 20 per cent. Anemia

affects about 55 per cent of women in the reproductive age range (15–49 years old). Remarkably, more urban women than rural ones are becoming obese. Given the magnitude of the problem, it is essential to understand the food value chain, especially at the point of consumption, and assess its accessibility, availability, use, stability, agency, and sustainability. The market and food production are essential variables commonly discussed in the literature, but little is known about how food gets to the plate. The knowledge base is even less sufficient regarding the different routes, agreements, decisions, and cultures determining what people eat and why. What are the obstacles to obtaining and utilizing wholesome food? What part do other institutions and the state play in combating malnutrition? (Sridevi et. al. 2023).

Reducing hunger and ensuring food security for all are the primary goals of SDG 2. In Telangana, 40 per cent of children are underweight, and the majority are members of vulnerable groups. The highest rate of stunting among these groups is found in children from STs (41.0 per cent), followed by SCs (35.2 per cent) and OBCs (31.6 per cent). ST women are more likely than OBC or SC to have a below-normal BMI (<18.5 kg/m²). Among these women, their percentage is 21.1 per cent. Gummadi et al. (2021, 2023) argue that dietary deficits must be promptly addressed and given direct attention in addition to indirect interventions.

Making a paradigm shift from consuming calories to consuming food high in protein and micronutrients is imperative. Through direct and indirect targeting, it is equally necessary to extend the four pillars of food security—availability, accessibility, utilization, and stability—to nutrition security. Giving malnourished groups access to enough nutrient-rich food would be the direct approach. In contrast, indirect methods would involve identifying bottlenecks and enhancing nutrition-rich food products' value chain and production processes. One of the feared realities of India has always been undernourishment and the health problems associated with it. The situation differs between the states based on the poverty level, literacy, the sparseness of the health infrastructure, and state assistance programs. The intake of particular foods by males and females in Telangana is illustrated in Tables 7 and 8.

TABLE 7: PER CENT DISTRIBUTION OF WOMEN AGED 15-49 BY FREQUENCY OF CONSUMPTION OF SPECIFIC FOODS, TELANGANA

Frequency of consumption	Daily		Weekly		Occasionally		Never	
	NFHS 4	NFHS 5	NFHS 4	NFHS 5	NFHS 4	NFHS 5	NFHS 4	NFHS 5
Milk or curd	55.6	71.3	18.8	14.9	17.4	10.2	8.3	3.6
Pulses or beans	27.7	35.2	62.2	56.6	9.4	7.6	0.7	0.6
Dark green leafy vegetables	13.2	20.4	64.8	59.7	20.7	19.1	1.3	0.9
Fruits	11.5	13.6	36.2	37.3	49.3	48.1	3.1	1.1
Eggs	6.2	13.6	54.3	63.1	31.3	18.2	8.2	5.2
Fish	0.6	0.8	22.9	17.8	53.8	65.7	22.7	15.8
Chicken or meat	1.5	1.5	51.3	68.5	37.2	23.5	10.0	6.6
Fish or chicken/meat	1.8	2.0	55.6	70.4	34.1	21.9	8.6	5.7
Fried foods	4.5	5.9	26.6	20.9	60.3	68.0	8.5	5.1
Aerated drinks	1.6	0.8	17.3	10.0	65.3	80.9	15.7	8.2

Source: International Institute for Population Sciences (IIPS) and ICF. 2021. National Family Health Survey (NFHS-5), India, 2019-20: Telangana. Mumbai: IIPS.

TABLE 8: PER CENT DISTRIBUTION OF MEN AGED 15-49 BY FREQUENCY OF CONSUMPTION OF SPECIFIC FOODS, TELANGANA

Frequency of consumption	Daily		Weekly		Occasionally		Never	
	NFHS 4	NFHS 5	NFHS 4	NFHS 5	NFHS 4	NFHS 5	NFHS 4	NFHS 5
Milk or curd	50.8	68.9	33.4	22.4	10.9	6.1	4.9	2.6
Pulses or beans	25.5	30.5	65.3	60.9	8.6	7.7	0.5	0.8
Dark green leafy vegetables	17.7	19.4	66.2	64.8	15.6	15.0	0.5	0.8
Fruits	8.5	11.1	51.7	49.8	38.4	38.0	1.4	1.1
Eggs	4.0	10.3	73.9	69.9	19.0	17.6	3.2	2.3
Fish	0.6	2.2	42.8	30.5	48.5	59.9	8.1	7.5
Chicken or meat	0.5	3.2	67.5	67.9	28.3	25.5	3.8	3.4
Fish or chicken/meat	0.8	4.6	72.8	70.0	23.6	22.8	2.8	2.6
Fried foods	2.7	7.0	30.7	28.5	52.1	55.6	14.5	8.9
Aerated drinks	5.7	3.7	37.0	26.2	49.9	60.4	7.4	9.7

Source: International Institute for Population Sciences (IIPS) and ICF. 2021. National Family Health Survey (NFHS-5), India, 2019-20: Telangana. Mumbai: IIPS

Women regularly consume more milk or curd than males, along with vegetables and pulses. Men eat more meat, eggs, and chicken each week than women. This consumption habit does affect the physical health of women and explains the rise in female anemia relative to male anemia. A four-year period in Telangana shows a decline in acute BMI for both males and females. Table 8 shows that anemia is rising for females, a severe health concern that affects the female population and, ultimately, the kids. Over four years, the number of stunted, wasted, and underweight children in Telangana has increased.

TABLE 9: NUTRITIONAL INDICATORS OF TELANGANA FROM NFHS 4 AND 5

	NFHS 4 (2015-16)			NFHS 5 (2019-20)		
	Urban	Rural	Total	Urban	Rural	Total
Children under 5 years who are						
Stunted	21	33.3	28	28.1	35.7	33.1
Wasted	14.9	20.4	18.1	20	22.6	21.7
Underweight	22.1	33.1	28.4	25.8	35	31.8
BMI Women (Acute)	15.9	29	22.9	13.5	21.6	18.8
BMI Women (Obese)	40.2	18.5	28.6	41.7	23.8	30.1
BMI Men (Acute)	17.8	24.6	21.5	15.2	16.8	16.2
BMI Men (Obese)	31.7	17.9	24.2	40.2	28.1	32.3
Anaemia in Women	54.9	58.1	56.6	55.2	58.9	57.6
Anaemia in Men	10	19.7	15.3	13.2	16.5	15.3
Children age 6-59 months who are anaemic	51.9	67.5	60.7	64.7	72.8	70

TABLE 10: NUTRITIONAL INDICATORS OF MANCHERIAL - NFHS 5

Nutritional Indicators	%
Stunting	25.9
Wasting	22.1
Underweight	27.4
Women whose Body Mass Index (BMI) is below normal (BMI <18.5)	21.9
Children age 6-59 months who are anaemic	58.7
All women age 15-49 years who are anaemic	56.7

Source: Table 9 - International Institute for Population Sciences (IIPS) and ICF. 2021. National Family Health Survey (NFHS-5), India, 2019-20: Telangana. Mumbai: IIPS. And Table 10 – NFHS 5, Mancherial District.

From Table 10, it is evident that, in the district of Mancherial, stunting and underweight are more than 20 per cent, and more than 50 per cent of children aged 06-59 months and reproductive-aged women (15-49 years) are suffering anaemia in the district. Table 11 depicts that underweight is high (25 per cent) in OBC children, whereas stunting is found to be similar (21 per cent) in SC and OBC children. With an understanding of the magnitude of undernutrition across various social and demographic groups of Telangana state and Mancherial district, we intend to understand the dimensions of nutrition security by studying Narwa village.

TABLE 11: CHILDREN UNDER AGE 5 - MALNUTRITION IN MANCHERIAL DIST. - CASTE WISE – NFHS 5

Caste	Underweight	Stunting	Wasting
SC	18	21	11
ST	5	5	4
OBC	25	21	19
Others	2	0	1
Total	27.4	25.9	22.1

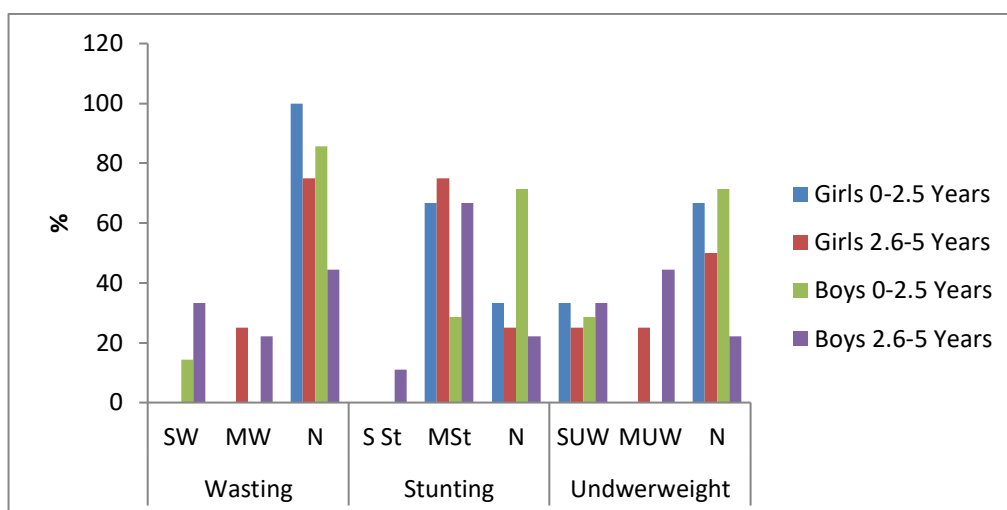
Source: International Institute for Population Sciences (IIPS) and ICF. 2021. National Family Health Survey (NFHS-5), India, 2019-20: Mancherial. Mumbai: IIPS.

IV

RESULTS FROM THE STUDY VILLAGE NARWA

The village of Narwa is situated in the Mancherial district's Jaipur Mandal. This village has 3.4 per cent OBCs, 7.4 per cent STs, and 89 per cent SCs. The majority of the farmers in this primarily rural area grow paddy for both personal consumption and sale. The study discovered that although OBC and Other-caste members are fewer, they own most of the agricultural land. At the same time, SCs and STs are employed in daily wage labour in the same village and its neighbouring villages (Jaipur Mandal). The populace is divided into distinct housing groups according to their caste. The SCs (mala) reside on the right side of the hamlet from the entrance, while the SCs (madiga) and STs are on the left. The sole temple in the hamlet and the gram panchayat office are closer to the sarpanch's home. The Public Distribution System (PDS) shop operates erratically and is accessible to dealers close to homes where OBCs predominate. The Anganwadi Center (AWC) is a large three-room building on a single plot next to the school. These three distinct rooms serve as the kitchen, the children's study, the dining area, sleeping quarters in the afternoon, and a location for food storage (eggs, milk, pulses, rice, and balamrutham packets). Male children in the AWC are about 70 per cent compared to female children in Narwa. These children's nutrition significantly depends on the AWC food consumption. Though quite a few kids are enrolled (about 25), only a small number of kids come to the AWC to study or eat (around 10). Most kids who learn and dine at the AWC are from the SC region. Due to the caste bias of their parents, children from the dominant caste are not allowed to attend AWC or

receive food from the AWC; nonetheless, upon their visit, Anganwadi Teachers (AWT) provide them with take-home rations (THR). There are no restrooms, even though the AWC and the school share the same property.



Source: Field Survey, 2023.

FIGURE 4: NARVA VILLAGE- UNDER 5 YEARS - CHILDREN MALNUTRITIONAL STATUS

Figure 4 shows that a higher proportion of girls between 0 and 5 years of age and boys between 2.6 and 5 years of age are found to be moderately stunted. Most of the children are less proportionately severely underweight, and SC children are moderately stunted. In the ST community, all the boys and girls between 2 and 6.5 years of age are found to be severely wasted, moderately stunted, and severely underweight. With this picture of children's malnutrition in the village, the following section sheds light on the nutritional indicator (BMI) for people above 5. Table 12 shows that ST females are more underweight (BMI<18.5) than others. Also, SC males and females and OBC males and females are more underweight than the ST community. Minimally, SC males and females; OBC females are more obese (BMI>30) than the ST community.

TABLE 12: BMI (IN %) - GENDER WISE AND CASTE WISE

BMI Category	SC		ST		OBC	
	Male	Female	Male	Female	Male	Female
<18.5	26.82	27.55	21.4	39.13	33.33	29.41
18.5 - 24.9	51.96	51.02	57.1	39.13	58.33	52.94
25.0 - 29.9	18.99	19.90	21.4	21.74	8.33	11.76
> 30.0	2.23	1.53	0	0.00	0	5.88

Source: Field Survey, 2023.

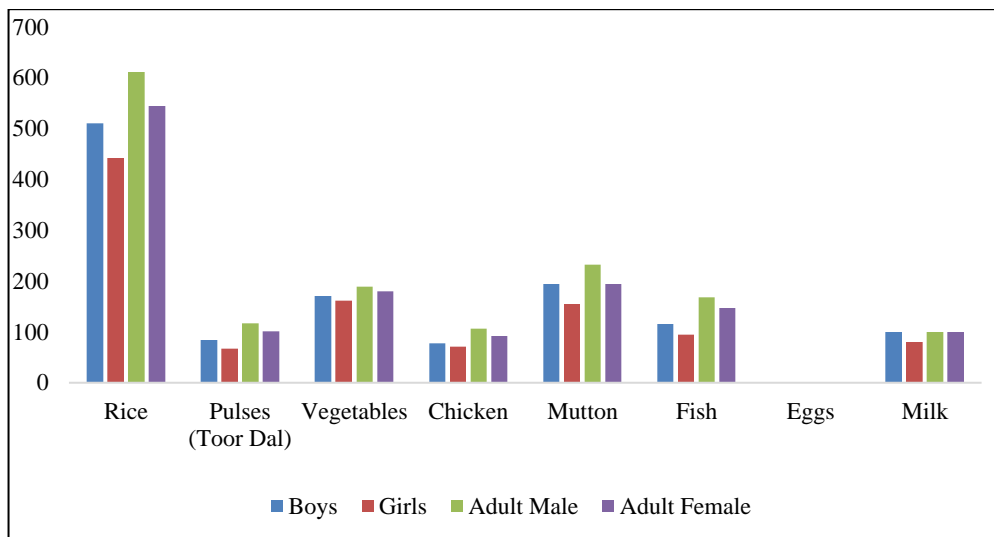
With the alarming picture of the BMI of the people in the village, the following section heads to the calorie and protein intake from their daily/weekly consumption of vegetarian and non-vegetarian food. The village has a weekly market inside the premises every Wednesday and outside the village near the Jaipur bus stand on Sundays. Wednesday's market has a minimal quantity of vegetables with fewer vendors. It is found that people aged above 50 cannot go outside the village for Sunday market, and households belonging to the low-income category (income < 20 000 p/m) with no motorbike or any other vehicle purchase from this market. Sunday's market is bigger, with lots of vendors and a variety of vegetables and other animal-based food items. On the other hand, most people consume animal-based food (chicken/mutton/fish) once a week, preferably on Sundays than other days. Fresh fish (Catla) is available for purchase on Sundays near the Jaipur bus stand. We found that more than half of Narwa's households purchase fish from the Jaipur market at the bus stand. Some households also purchase chicken. Unlike chicken and other animal-based food, fish is Narwa consumers' preferred item.

The fish was sold at Rs. 150 per kilogram. We found that most fish weigh more than one kilogram and were sold as one unit. Therefore, households consume more than one kilogram of fish in every purchase for a household size of 2 to 6 individuals. Household size and income are positively associated with the fish purchase. "In our family, we are six members, and we like fresh fish (catla) on Sundays rather than chicken. So, I am purchasing 3.5 kilo of fish. I purchase chicken when no good fish is available, " says a respondent. The murrel fish is one of a kind. It is sold alive to consumers at Rs. 650/- per kilogram, which is a bit more expensive than catla (Rs. 150 per kilogram) and rohu (Rs. 160 per kilogram). Dried fish are available at the Sunday market. This dried fish is purchased by the retail vendor from the Nizamabad wholesale market and sold in the Sunday market.

"I buy these dried fish from Nizamabad. Nizamabad has a big dried fish market. They get dried fish from Andhra (Narsipatnam). And I sell these dried fish in the weekly markets in this Jaipur mandal. I bought Nethhallu (Anchovies) from Nizamabad at Rs.650/kg. I sell here at Rs. 450 for half a kilo", says a dried fish vendor in the Sunday market.

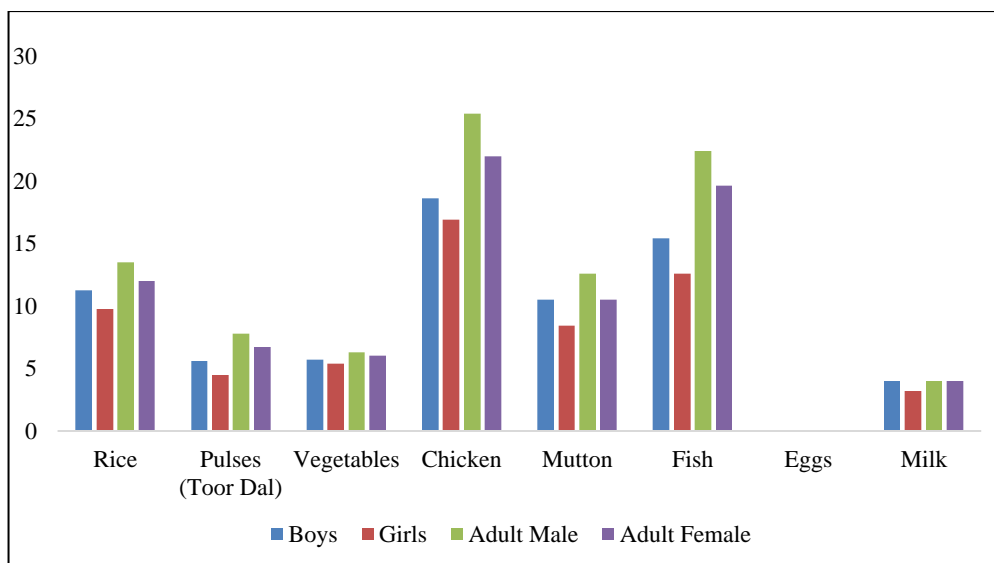
The chicken is priced at Rs. 250 per kilo and mutton at Rs. 800 per kilo at the time of field survey in 2023. The families in the village consume rice, pulses, vegetables, and milk daily. On the other hand, families eat at least one egg per head in a week and eat Chicken, Mutton, or Fish weekly but not all together or both at a time. Figure 5 depicts the daily calorie intake of food consumption in boys, girls, adult males, and females aged 06 to 90. Males are found to be consuming more calories in food than females. Calories from rice are more as it is the staple food, while in the meat category, calories from mutton are more than fish and chicken. Interestingly, the calories from chicken and fish were similar, with dismal differences. There's very little consumption of eggs in the village. Figure 6 depicts the protein intake of males and females. The consumption pattern is found to be as similar as calorie intake. Adult males are

consuming more protein-rich food than their counterparts. Chicken and fish contribute to a substantial intake of nutrition among households.



Note: Rice, Pulses, Vegetables, Eggs, and Milk – Calories/daily consumption. Chicken/Mutton/Fish – Calories/week consumption.

FIGURE 5: CALORIE INTAKE – PER DAY CONSUMPTION



Note: Rice, Pulses, Vegetables, Eggs, and Milk – Calories/daily consumption. Chicken/Mutton/Fish – Calories/week consumption.

Source: For Fig. 5 & 6; Field Survey, 2023.

FIGURE 6: PROTEIN INTAKE – PER DAY CONSUMPTION

v

CONCLUSIONS AND POLICY IMPLICATIONS

The study emphasizes the significant role that fish can play in improving nutrition security, especially in rural areas like Narwa village in Telangana, India. Fish, particularly small indigenous species, provide high-quality protein and essential micronutrients at an affordable cost, which can be instrumental in alleviating malnutrition. The study shows that fish offers more nutrients than other animal proteins like poultry and livestock, making it an effective way to address the high rates of stunting, wasting, and anemia that are widespread in rural India, especially among vulnerable populations like children and women.

One of the key findings is that while fish production is growing, the infrastructure for distributing fish needs significant improvement to increase access for the broader population. Investments in cold storage, transportation, and market access could help ensure that fish reaches rural and low-income populations who would benefit most from its nutritional value. The study highlights that despite its advantages, fish consumption remains low compared to other protein sources, largely due to cultural preferences and a lack of awareness about its health benefits. This presents a major opportunity for government initiatives to promote fish as a vital part of the diet in areas facing malnutrition.

Efforts to increase fish consumption should include public awareness campaigns and education programs to inform rural communities about the health benefits of incorporating fish into their regular diet. Additionally, expanding fish production through sustainable aquaculture practices could help increase the availability of this nutrient-dense food while providing economic opportunities for rural populations. Programs like the Pradhan Mantri Matsya Sampada Yojana (PMMSY) are already helping boost fish production, but more focus on sustainable practices is needed to ensure long-term benefits without harming the environment.

Another important policy implication is the need to include fish in government nutrition programs. Programs such as the Mid-Day Meal Scheme and the Integrated Child Development Services (ICDS) could incorporate fish into their menus to help combat malnutrition, particularly in regions where children suffer from severe deficiencies in essential nutrients like protein and iron. The study reveals that in Narwa village, households prefer fish over other animal proteins due to its affordability and nutritional value. Incorporating fish into government-sponsored nutrition programs could therefore help improve health outcomes for many vulnerable populations.

Finally, the study points to the need for targeted policies aimed at helping vulnerable social groups such as Scheduled Castes (SC) and Scheduled Tribes (ST), who show higher levels of malnutrition compared to other groups. Efforts should focus on improving access to nutrient-rich foods like fish for these communities, with particular attention to women and children, who are disproportionately affected by malnutrition. Overall, promoting fish consumption as part of a balanced diet could play

a crucial role in addressing India's malnutrition challenges, while also supporting economic development in rural areas.

REFERENCES

- Béné, C., Macfayden, G., & Allison, E. H. (2007). Increasing the contribution of smallscale fisheries to poverty alleviation and food security. FAO Fisheries Technical paper no. 481, FAO, Rome.
- Béné, C., Barange, M., Subasinghe, R., Pinsturp-Andersen, P., Merino, G., Hemre, G.I., Williams, M., 2015. Feeding 9 billion by 2050-Putting fish back on the menu. *Food Secur.* 7 (2), 261–274. <https://doi.org/10.1007/s12571-015-0427-z>.
- CFS, 2012. 39th session of the committee on World food security (CFS). <http://www.fao.org/3/MD776E/MD776E.pdf>
- Development Initiatives, 2018. 2018 Global Nutrition Report: shining a light to spur action on nutrition. From <https://globalnutritionreport.org/reports/globalnutrition-report-2018/>
- Department of Fisheries. Govt. of India (2022).
- Department of Fisheries. Govt. of Telangana (2022).
- Department of Fisheries, States Government / UTs Administration, 2021-22
- District Fisheries officer, District Administration, Mancherial, Government of Telangana State.
- FAO, 2006. Food security policy brief. Vol. June 2006 Issue 2 from http://www.fao.org/fileadmin/templates/faoitally/documents/pdf/pdf_Food_Security_Cocept_Note.pdf
- FAO, 2011. Combating micronutrient deficiencies: food-based approaches. from <http://www.fao.org/docrep/013/am027e/am027e.pdf>
- FAO, 2019a. The state of food security and nutrition in the World 2019. from <https://www.unicef.org/media/55921/file/SOFI-2019-full-report.pdf>
- FAO, 2022. The State of World Fisheries and Aquaculture 2022 from <https://openknowledge.fao.org/server/api/core/bitstreams/a2090042-8cda-4f35-9881-16f6302ce757/content>
- Gummadi, Sridevi; Jyotishi, Amalendu and Prashanth, Dontha, (2021), 'Malnutrition and Inequality among the Vulnerable Social Groups: A Study of Two Villages', *Journal of Development Policy Review (JDPR)*, Vol. 1, Issue 4 October – December 2020
- Gummadi Sridevi, Amalendu Jyotishi, Balaji, Pattur and Matta Srinivas (2023), "Is ICDS Intervention in Telangana Dwindling? A Quest", *Indian Journal of Agricultural Economics* Volume 78, Number 3, July -September 2023. <https://isaeindia.org/wp-content/uploads/2024/02/July-September-2023-01-Gummadi-Sridevi.pdf>
- Hasselberg, A. E., Aakre, Inger Aakre, Joeri Scholtens, Ragnhild Overå, Jeppe Kolding, Handbook of Fisheries, Department of Fisheries, GoI
- Michael S. Bank, Amy Atter, Marian Kjellevoid (2020). Fish for food and nutrition security in Ghana: Challenges and opportunities. *Global food security*, 26, 100380.
- Ministry of Health and Family Welfare (MoHFW), Government of India, UNICEF and Population Council. 2019. Comprehensive National Nutrition Survey (CNNS) National Report. New Delhi.
- Handbook of Fisheries, Department of Fisheries, GoI
- International Institute for Population Sciences (IIPS) and ICF. 2015-16, 2019-2021. National Family Health Survey (NFHS-4 and 5), India, 2019-20: Ministry of Health and Family Welfare (GoI). Mumbai: IIPS.
- International Institute for Population Sciences (IIPS) and ICF. 2015-16, 2019-2021. National Family Health Survey (NFHS-4 and 5), Telangana, 2019-20: Ministry of Health and Family Welfare (GoI). Mumbai: IIPS.
- Jonsson, U., 1992. Nutrition and Ethics, Paper Presented at Meeting on Nutrition, Ethics, and Human Rights. Norwegian institute of Human Rights, Oslo
- Mohanty, B. P., Mahanty, A., Ganguly, S., Mitra, T., Karunakaran, D., & Anandan, R. (2019). Nutritional composition of food fishes and their importance in providing food and nutritional security. *Food chemistry*, 293, 561-570.
- Roos, N., Islam, M., & Thilsted, S. H. (2003). Small fish is an important dietary source of vitamin A and calcium in rural Bangladesh. *International Journal of Food Science and Nutrition*, 54, 329–339.
- Thilsted, S.H., James, D., Toppe, J., Subasinghe, R., Karunasagar, I., 2014. Maximizing the contribution of fish to human nutrition. In: CN2 Second International Conference on Nutrition, FAO and World Health Organization, from <http://www.fao.org/3/ai3963e.pdf>
- Tacon, A.G.J., Metian, M., 2015. Feed matters: satisfying the feed demand of aquaculture. *Rev. Fish Sci. Aquacult.* 23 (1), 1–10. <https://doi.org/10.1080/23308249.2014.987209>.
- UN, 2015. Sustainable development goals. from <https://www.un.org/sustainabledevelopment/>
- UNICEF, 2019. Malnutrition. from <https://data.unicef.org/topic/nutrition/malnutrition/>