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Dietary Behavior, Diet Quality and Lifestyle Patterns among Selected Coastal Fishing Communities in Ramanathapuram District, Tamil Nadu: A Cross-Sectional Study

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ABSTRACT

Background: Diet quality and lifestyle practices are important determinants of nutritional status and health. The present study assessed the dietary behavior, diet quality and lifestyle patterns among selected coastal fishing communities in Ramanathapuram district, Tamil Nadu, India. **Methods:** A community-based cross-sectional study was conducted among 550 participants using simple random sampling. Data were collected using a self-developed validated interview schedule, Food Frequency Questionnaire (FFQ), and the standardized Diet Quality Questionnaire developed by the Global Diet Quality Project. **Results:** Most participants belonged to the age groups of 36 to 55 years. Nearly half of the participants had normal body mass index (BMI), while over one-third were overweight and the majority were categorized as having high-risk waist-to-hip ratio. Self-reported diabetes mellitus and hypertension were reported by approximately one-third of the participants. Meal skipping was prevalent and following cereal and seafood-based diet was predominant among the participants. Moreover, tea was the most frequently consumed beverage. Diet quality assessment also revealed inadequate consumption of fruits, nuts and seeds and vitamin A rich oods. The mean Dietary Diversity Score and Global Dietary Recommendation Score were 4.72±1.32 and 9.84±1.28 respectively, indicating poor dietary diversity and suboptimal diet quality. **Conclusion:** The study demonstrated inadequate dietary diversity and unhealthy lifestyle practices among the coastal fishing community. These findings emphasize the need for context-specific nutrition education and health promotion strategies to improve dietary quality and promote healthy lifestyle practices.

Introduction

The fisheries sector provides livelihood to nearly 60 million people worldwide, with the majority of fishers residing in Asia. Globally, India ranks second in marine fisheries production, with approximately 14 million people actively engaged in fisheries, accounting for 8 % of the total global fisheries output (Ministry of Fisheries Animal Husbandry and Dairying, 2025). The eastern coastal region contributes substantially to India's marine fish production, with Tamil Nadu

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accounting for nearly 14 % of the national production (Ahmed and Ahmed, 2022). In addition, diet quality plays a vital role in maintaining health, whereas poor dietary behavior and unhealthy lifestyle practices increase the risk of obesity, diabetes mellitus, cardiovascular diseases and cancers (Grosso *et al.*, 2020). Socioeconomic conditions, educational status and occupation strongly influence dietary choices and limited awareness or affordability of healthy foods may contribute to the double burden of malnutrition (Miller *et al.*, 2020). There is a well-established relationship between socioeconomic conditions and dietary quality. Alarmingly, obesity, irregular eating patterns and poor quality breakfasts are highly prevalent in the most deprived areas (Bunn and Rolker, 2022).

Numerous studies have shown that Indian adults consume excessive amounts of salt, oils and meats while fruits, vegetables, legumes and eggs remain below recommended levels (Jain *et al.*, 2023). Studies among fishing communities have reported that dietary diversity and food security are closely associated with household income (Roberts *et al.*, 2022), while unhealthy lifestyle practices and macro- and micronutrient deficiencies are common among fisherfolk populations (Rahaman *et al.*, 2021). Although research on nutrition and health transitions has progressed significantly in India, limited evidence is available regarding dietary behavior, diet quality and lifestyle practices among coastal fishing communities in Tamil Nadu. Understanding these aspects is essential for identifying nutritional concerns and promoting healthy lifestyle practices among vulnerable fishing populations (Ramachandran and Kalaivani, 2023). Therefore, the present cross-sectional study was undertaken to assess dietary behavior, diet quality and lifestyle patterns among selected coastal fishing communities in Ramanathapuram district, Tamil Nadu, India.

Materials and Methods

Study design

A community-based cross-sectional study was conducted among coastal fishing communities of Ramanathapuram District, Tamil Nadu, India, using a structured interview schedule to collect the required information.

Study settings and sampling

This study involved the coastal fishing communities of Ramanathapuram district, known for its extensive coastline and substantial population engaged in marine fishing and allied activities. Using simple random sampling technique, the sample size was calculated through the formula provided by Yamane (Yamane, 1967), $n=N/1+N*(e^2)$, resulting in a minimum of 400 participants.

The study involved about 550 fisherfolk from the coastal villages of Ramanathapuram district. Individuals aged between 20 and 60 years who were actively engaged in fishing and allied occupations, those who played key role in household economy and provided written informed consent were included in the study. Those who were unwilling to participate, did not provide informed consent, had severe or acute medical conditions or were not involved in fishing and allied activities during the study period were excluded.

Study instrument

A well-structured, self-developed interview schedule was used to collect information on demographic characteristics, anthropometric measurements, dietary behavior, and lifestyle patterns. The content validity of the interview schedule was established using the Content Validity Index (CVI) method (Yusoff, 2019). The scale-level Content Validity Index (S-CVI) was 0.96, suggesting a high-degree of agreement among experts. Reliability of the interview schedule was assessed using Cronbach's alpha coefficient. During the study, participants were interviewed to gather basic information such as age, family type, family size, occupational structure and monthly income.

Anthropometric assessment including height, weight, waist and hip circumference was recorded with calibrated instruments. Height was measured using a portable stadiometer to the nearest 0.1 cm

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and body weight was recorded using a calibrated digital weighing scale to the nearest 0.1kg. Waist and hip circumference were also measured using a non-stretchable measuring tape. Body mass index (BMI) and waist-to-hip ratio were calculated and classified according to World Health Organization (WHO) guidelines (World Health Organization, 2008). Information regarding self-reported history of non-communicable diseases (NCDs), including diabetes mellitus, hypertension and heart disease was then collected during the survey.

Assessment of dietary behavior, diet quality and lifestyle patterns

The interview schedule included separate sections to assess dietary behavior and lifestyle patterns among the fishing communities. Dietary behavior was assessed by obtaining information on food habits, frequency of meal skipping, water and beverage consumption per day, type of cooking oil used, amount of cooking oil used per month, and frequency of dining out. Lifestyle-related variables included sleep hygiene, substance use, and duration of fishing activities.

In addition, a Food Frequency Questionnaire (FFQ) was used to assess the frequency of consumption of major food groups, including cereals, pulses and legumes, roots and tubers, vegetables, fruits, milk and milk products, flesh foods, sugars, fats and oils, nuts and beverages. The frequency of consumption was recorded as daily, weekly, monthly, occasionally, or never.

Diet quality was assessed using the standardized Diet Quality Questionnaire (DQQ) developed by the Global Diet Quality Project. The DQQ is a low-burden dietary assessment tool based on foods consumed during the previous day and uses yes or no questions to record the consumption of specific food items across 29 food groups (Adeyemi *et al.*, 2025). The questionnaire enables the estimation of key diet quality indicators, including Dietary Diversity Score (DDS), Non-Communicable Disease Protect Score (NCD-Protect), Non-Communicable Disease Risk Score (NCD-Risk) and Global Dietary Recommendation Score (GDR-Score), thereby facilitating the assessment of dietary diversity, nutrient adequacy, and dietary risk factors associated with NCDs.

Ethical considerations

The Institutional Human Ethical Committee (IHEC) at Avinashilingam Institute in Coimbatore approved the study (AUW/XMT-038 and FSMD/IHEC/23-24). The approval process ensured that the research adhered to ethical standards. Additionally, written informed consent was obtained from all participants after explaining the purpose and procedures of the study in the local language.

Data analysis

The collected data were cleaned, coded, entered into Microsoft Excel, and subsequently, analyzed using the Statistical Package for the Social Sciences (SPSS) version 27. Descriptive statistics, including frequency, percentage, mean and standard deviation were used to summarize the demographic characteristics, dietary behavior, diet quality and lifestyle patterns of the participants.

Results

The dietary behavior and lifestyle pattern of the selected participants (n=550) were assessed. As shown in **Table 1**, about 30% of the participants belonged to the age groups of 36-45 years and 46-55 years, respectively. Most of the selected participants belonged to nuclear families (89%) and nearly two-fifths (40%) had four family members. About 37% had a monthly income ranging from 7,681 to 10,240 Rupees.

Based on WHO criteria, about 45% of the participants had normal BMI, while 35% were overweight and 13% were obese. According to waist-to-hip ratio, 92% of the participants were categorized as having high risk waist-to-hip ratio. Self-reported diabetes mellitus and hypertension were also reported by about 31% of the participants respectively.

Table 2 shows the lifestyle characteristics of the selected participants. Most of the participants (72%) spent three to six hours in fishing activities

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and about 79% reported sleeping for three to five hours per day. Good quality of sleep was reported by 67% of the participants, whereas 24% experienced disrupted sleep. Smoking and alcohol consumption were also reported by 32 and 31% of the participants, respectively.

Table 1. Demographic profile of the selected participants.

Variables	n	%
Age (years)		
< 24	19	4
25-35	75	14
36-45	167	30
4655	166	30
≥56	123	22
Type of family		
Nuclear	491	89.3
Joint	59	10.8
Number of family members		
2	110	20
3	122	22.2
4	217	39.5
≥5	101	18.4
Monthly income (Rupees)		
<1000	10	1.9
1001 to 3000	36	6.5
3001 to 5000	82	14.9
5001 to 7680	163	29.6
7681 to 10240	204	37.1
10241 to 20481	51	9.3
>20482	4	0.7
BMI(kg/m2)		
Underweight	31	5.6
Normal	249	45.3
Overweight	196	35.6
Grade 1 obese	65	11.8
Grade 2 obese	8	1.5
Extremely obese	1	0.2
WHR		
No risk	45	8.2
High risk	505	91.8
Self-reported medical history		
Diabetes mellitus	171	31.1
Hypertension	174	31.6
Heart disease	9	1.6

***BMI**: Body mass index; **WHR**: Waist-to-hip ratio (low risk (<0.95 for men and <0.80 for women).*

Table 3 presents the dietary behavior of the participants. Meal skipping was reported by 76% of the participants, of whom 63% skipped meals daily. Most of the participants (70.4%) consumed seven to eight glasses of water per day and 95% consumed beverages. Tea varieties were the most frequently consumed beverages (91%) and about 34% consumed three servings of beverages per day. Refined sunflower oil (46%) and palm oil (69%) were the commonly used cooking oils. Moreover, about 80% reported using more than three liters of cooking oil per month.

Table 4 shows the pattern of dining out and snack consumption Dining outside was reported by 82% of participants, with 47% consuming foods away from home daily. Snacks were the most frequently consumed foods outside the home (73%). Fried snacks such as bajji or bonda and vada were consumed by 70 and 48% of the participants, respectively.

Table 2. Lifestyle pattern of the selected participants.

Lifestyle pattern	n	%
Spent time on fishing		
Three to six hours	394	71.6
Seven to ten hours	102	18.5
One day	44	8.0
More than a day	10	1.8
Spent time on sleep		
Below 3 hours	22	4
Three to five hours	435	79.1
Six hours or more	93	16.9
Quality of sleep		
Good	370	67.3
Disrupted	130	23.6
Having difficulty	50	9.1
Habit of substance use		
Smoking (beedi/cigarette)	178	32.3
Alcohol	169	30.7

Table 5 presents the diet quality indicators derived from the DQQ. Consumption of grains, roots and tubers, and pulses were universal among participants. Dairy products and other vegetables were consumed by 97 and 85% of the participants respectively, whereas fruits, nuts and seeds, vitamin A rich fruits, and vegetables were consumed less frequently. The mean Dietary Diversity Score was 4.72±1.32, and 78% of the participants had inadequate dietary diversity.

Deep fried foods were consumed by 70.7% of the participants, while soft drinks and baked sweets

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were consumed by 13 and 9 % respectively. The mean NCD-Risk score was 1.64±0.96 (**Table 6**).

The mean NCD-protect score, NCD-risk score and Global Dietary Recommendation score were 2.48±1.11, 1.64±0.96 and 9.84±1.28, respectively (**Table 7**)

Table 3. Dietary behaviour of the selected participants.

Dietary behaviour	n	%
Skipping of meals		
Yes	417	75.8
No	133	24.2
Frequency of skipping meals		
Daily	347	63.1
Occasionally	68	12.3
Water drink per day (glass)		
<5	9	1.6
5-6	146	26.5
7-8	387	70.4
>8	8	1.5
Habit of consuming beverages		
Yes	521	94.7
No	29	5.3
Type of beverage		
Plain milk	17	3.1
Coffee varieties	70	12.7
Tea varieties	501	91.1
Number of servings of beverages per day		
1	82	14.9
2	155	28.2
3	188	34.2
>4	96	17.5
Type of cooking oil		
Coconut oil	22	4.0
Groundnut oil	4	0.7
Sesame oil	3	0.6
Palm oil	380	69.1
Refined sunflower oil	251	45.6
Amount of cooking oil used per month (litre)	111	20.2
<3	439	79.8
>3		

Figure 1 illustrates the frequency of seafood consumption among the participants. Beside fish, dry fish was consumed daily by a small proportion of the participants.

Discussion

WHO emphasizes that diet, lifestyle choices, and substance use significantly impact NCDs risks. This study seeks to delve into the dietary behaviors, diet quality, and lifestyle patterns specific to coastal fishing communities residing in Ramanathapuram District. The study revealed that substantial proportion of the participants belonged to the middle-aged group and lived in nuclear families with low to moderate monthly incomes. Although nearly half of the participants had normal BMI, a significant proportion (36%) were overweight or obese. In addition, a high proportion of the participants were categorized as having high-risk waist-to-hip ratio, indicating increased cardiometabolic risk. Self-reported diabetes mellitus and hypertension were reported by approximately one-third of the participants. These findings were notably higher than the combined prevalence rates reported by (Doddamani *et al.*, 2021) (20% for hypertension and 10% for diabetes).

The findings of the present study also demonstrated unfavorable lifestyle practices among the participants. Most participants reported limited sleep duration of three to five hours, although the majority perceived their sleep quality to be satisfactory. Furthermore, smoking and alcohol consumption were more prevalent among nearly one-third of the participants. Similar findings were reported by (Basavakumar *et al.*, 2011), who observed a high prevalence of smoking, alcohol, and betel nut chewing consumption among both adult fishermen and fisherwomen. These unhealthy lifestyle practices represent important modifiable risk factors and highlight the pressing need for health promotion programs aimed at improving behavioral practices among fishing communities.

Fish constituted the major animal-source food and was consumed daily or weekly by most participants reflecting the community's occupational reliance on fishing. Egg consumption was relatively common, whereas the intake of mutton, chicken, and organ meats was less frequent. Similar observations have been reported by (Patro *et al.*, 2020), who identified fish as the principal source of dietary protein among fishing communities. Likewise, Gibson *et al*. reported that fresh fish was the most frequently consumed

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animal source food among fisher households in Indonesia (Gibson *et al.*, 2020).

Tea was the most commonly consumed beverage among the participants and dining outside was frequently reported. The habitual consumption of fried snacks and sugar sweetened beverages reflects the transition towards unhealthy dietary practices among fishing communities. The fried snacks such as bajji or bonda and vada were consumed daily, followed by weekly consumption of confectionaries such as biscuits, bread, or bun and occasional consumption of sweets. Similar findings were reported by (Annadurai *et al.*, 2018), who observed frequent consumption of beverages such as tea, coffee, and locally prepared fried foods among the fishing community of Kancheepuram District, Tamil Nadu, India. These dietary practices warrant targeted dietary intervention among fishing communities.

Table 4. Pattern of dining out and snack consumption.

Dietary behavior	n	%
Habit of dining outside		
Yes	452	82.2
No	98	17.7
Frequency of dining outside		
Daily	257	46.7
Weekly	48	8.7
Monthly	105	19.1
Occasionally	42	7.7
Type of foods consumed outside		
Snacks	399	72.5
Beverages	160	29.1
Meals	35	6.4

Frequency of snacking (%)	Daily	Weekly	Occasionally	Never
Fried snack 1 (Bajji/Bonda)	69.8	20.4	5.1	4.7
Fried snack 2(Vada)	48.4	35.8	6.5	9.2
Biscuits	9.3	63.1	7.1	20.5
Bread / Bun	4.4	60	8.4	27.2
Sweets	0	14.5	43.6	43.4

Table 5. Diet quality indicators based on the diet quality questionnaire.

Diet quality components	n	%
Grains, white roots and tubers, and plantains	550	100
Pulses	550	100
Nuts and seeds	13	2.4
Dairy	535	97.3
Meat, poultry, fish	122	22.2
Eggs	114	20.7
Dark green leafy vegetables	136	24.7
Other vitamin A rich fruits and vegetables	62	11.3
Other vegetables	465	84.5
Other fruits	42	7.6
Nutrient inadequacy (0-5)	429	78
Nutrient adequacy (6-10)	121	22
Dietary diversity score (0-10) (Mean±SD)	4.72±1.32	

Meal skipping was also highly prevalent compromising dietary adequacy. The overall dietary pattern was predominantly cereal-based. Although pulse consumption was common, the intake of whole grains, fruits, and nutrient-dense vegetables remained limited. Similar dietary patterns have been reported among Amazonian communities, where cereals constitutes the staple food and fish serves as the principal sources of protein (Medeiros and Mainbourg, 2023). Such monotonous dietary patterns may adversely affect nutrient adequacy and dietary diversity.

Diet quality assessment based on the Diet Quality Questionnaire revealed universal consumption of grains and pulses among the selected fishing community. Whereas the intake of micronutrient

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dense food groups, including fruits, nuts and seeds, was relatively low. The mean dietary diversity score was 4.72±1.32 with the majority of participants exhibiting inadequate dietary diversity. Furthermore, frequent consumption of deep-fried foods resulted in NCD-Risk mean score of 1.64±0.96, whereas the low NCD-Protect score of 2.48±1.11 indicates suboptimal adherence to healthy dietary recommendations. Similar findings have been reported among fishing communities as they heavily rely on cereals as staple foods, with limited intake of whole grains, fruits and vegetables likely due to economic constraints and limited nutritional awareness. Fruit intake was notably low (2-5% daily), restricted mainly to locally available varieties, which indicates limited dietary diversity probably influenced by economic constraints and food access. These patterns are consistent with findings by (Sandaruwan *et al.*, 2016), who noted fishermen's preference for apples, grapes, watermelon, oranges, papayas and bananas to address dehydration with perishable fruits consumed within four days. Studies show that nutritional awareness is positively associated with diet quality, dietary diversity, and adherence to dietary recommendations. The fishing communities often face low and unstable income contributing to poverty and nutritional deficiencies. Targeted interventions focusing on nutrition education, health promotion, and addressing educational gaps are necessary (Rahaman *et al.*, 2021).

The strengths of the present study include its community-based design and relatively large sample size. The use of the standardized Diet Quality Questionnaire enabled a comprehensive assessment of dietary behavior and diet quality among a population with limited available evidence. The study has certain limitations. Information obtained through interviews and self-reported medical history may be subject to recall bias. In addition, the cross-sectional design limits causal interpretations of the study. Dietary intake assessed using the previous-day recall approach of the Diet Quality Questionnaire may not fully represent habitual dietary intake. Future research employing longitudinal designs and intervention approaches are warranted to improve dietary diversity and promote healthy lifestyle practices among coastal fishing communities.

Table 6. Unhealthy food consumption as an indicator of dietary factors for ncds among the selected participants.

Unhealthy food consumption	n	%
Soft drinks	70	12.7
Baked/grain-based sweets	51	9.3
Other sweets	12	2.18
Deep fried food	389	70.7
Packaged ultra processed foods	3	0.54
NCD-Risk score(0-9) (Mean±SD)	1.64±0.96	

Table 7. Global dietary recommendation score of selected participants.

Global dietary recommendation score	Mean±SD
NCD protect score (0-9)	2.48±1.11
NCD risk score (0-9)	1.64±0.96
Global dietary recommendation score (NCD-Protect - NCD-Risk + 9 = GDR score)	9.84±1.28

NCD: *Non communicable disease*

Conclusions

The present study revealed that the diet quality, dietary behavior, and lifestyle patterns of coastal fishing community in Ramanathapuram District, Tamil Nadu, India, were characterized by a cereal and seafood-based dietary pattern with inadequate consumption of micronutrient-rich food such as fruits, dark green leafy vegetables and nuts. Frequent consumption of deep-fried snack and sugar-sweetened beverages together with unhealthy lifestyle practices including smoking, alcohol use, and short sleep duration were commonly observed. These findings emphasize the need for context-specific nutrition education and health promotion strategies to improve dietary diversity and encourage healthy lifestyle practices among coastal fishing communities.

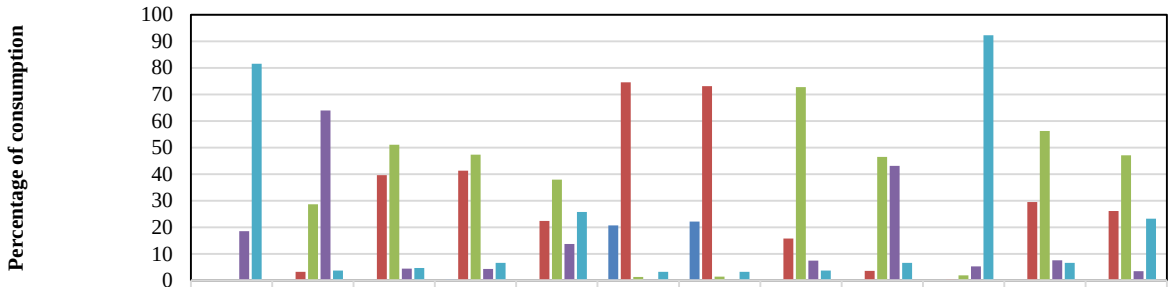
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	Beef	Chicken	Crab	Dry fish	Dry Prawn	Egg	Fish	Mutton	Organ Meats	Pork	Prawn	Snails
Daily	0	0	0	0.4	0	20.7	22.2	0	0	0	0	0
Weekly	0	3.3	39.6	41.3	22.4	74.5	73.1	15.8	3.6	0.4	29.5	26.2
Monthly	0	28.7	51.1	47.3	38	1.3	1.5	72.7	46.5	2	56.2	47.1
Occasionally	18.5	64	4.5	4.4	13.8	0.2	0	7.5	43.1	5.3	7.6	3.5
Never	81.5	3.8	4.7	6.7	25.8	3.3	3.3	3.8	6.7	92.3	6.7	23.3

Figure 1. Pattern of consuming non-vegetarian foods.

Authors' contributions

Srinivasanarayanan A contributed to the conceptualization of the study, methodology design, data collection, statistical analysis, data interpretation, and drafting of the manuscript. Palanivelu SS supervised the research work, provided guidance in study design and methodology, and critically reviewed and edited the manuscript.

Conflict of Interest

The authors declared no conflict of interest.

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