viii. **An abstract, describing the objectives, methodology of the proposed project:**

Fish and fishing is an important occupation in the costal areas of India. Puducherry being a coastal area has a large population of fishermen. Though fishermen can be classified as Maritime and inland fishers, the real; crux on the health and nutritional status of the maritime fishers is an unsolved issue addressed. The complication of the occupation and the high illiteracy rate would be a booming reason behind this. With this as the basis, a research has been designed to study the nutritional and health status of the fishermen population in Puducherry region. The main objective of the study is to assess the food and nutrient intake, nutritional status in terms of Anthropometric measurements, Prevalence of Clinical signs of Nutritional deficiencies and morbidity pattern among different age, gender and physiological group. Further the objective extends to assess the Knowledge, Attitude and Practice on the importance of Nutrition, sanitation and hygiene and common diseases among the adult fishermen. Puducherry region consists of 15 Maritime areas having 51350 households, out of which 3% of the households will be selected for the study. The population from the maritime areas would be selected by applying stratified random sampling method. Through this unbiased sampling technique 1540 households will be included in the study. The results of the study would script a clear picture of the current nutrition and health status of the fishermen population in Puducherry eliciting the importance to be torched on the fishermen population of Puducherry.

ix. **Details of the project proposal including the state -of – art of the subject, the work already done in this area in India/ abroad and defining clearly the objectives and methodology and year phasing of the project :**

STATE OF ART OF THE SUBJECT

Health is considered as a fundamental human right and a worldwide social goal. It encompasses all humans disregard of age. Geographical conditions, culture, economic status and life style of people have major impact on their health. Thanks to scientific advancements that the life style of the people is

tremendously metamorphosing and their physical activities are getting minimal. Illiteracy and purchasing potential determinates the food style which is not in conformity to the accustomed geographical or cultural conditions. This results in a wide range of health issues visibly seen as obesity, diabetes and related diseases. If this is the scenario midst the affluent population, malnutrition and low immunity - perpetuating secondary diseases are abounding with the poorest of the poor of the population.

Fish and fisheries is an important sector in most of the developing and developed countries of the world from the stand point of income and employment generation. The role of fisheries in Indian economy is gaining momentum as a result of introduction of advanced techniques to increase the yield per unit area of water and due to its role in earning foreign exchange. Apart from this, the twin problems of unemployment and malnourishment at the rural sphere in India can be simultaneously addressed to by proper and planned utilization of available local resources through involvement of local people. The quintessence of the intended investigation rests upon the Complete nutritional survey data which would be capable of addressing the health of malnourished as well as obese fishermen population: a commonly seen amalgamation in all fishing communities especially as ours. Prima facie, the present study warrants for a multi-disciplinarian approach: Physicians for identification of health status ; biochemists for making critical analysis of the outcome of the result while the investigation rests on the pedestal of Food Science and Nutrition. The scope of the study not only confines to laboratory investigations but to the community on the whole.

WORK ALREADY DONE IN THIS AREA

T. Lawrie et.al.,(2004) stated that Health promotion and education initiatives should be conducted to raise fishermen's awareness of the dangers of passive smoking and they should be made aware of the existing services that are provided to help smokers quit. Fishermen should be encouraged to

eat more fruit and vegetables, especially at sea, and should be encouraged to try and regulate their meal times as much as possible.

Olga Shiryaeva et al (2011) found that trawler fishermen exhibited impaired lung function and were more likely to have asthma. The environment of the onboard factories where fishermen fillet fish is suggested as a risk factor for work-related respiratory symptoms.

Zulkarnaini et.al.,(2006) To increasing family income, it is expected that Health Office and Fishery Office can provide training on utility appropriate technology so increasing the community knowledge and skill on processing, storage/ preservation of the food in order to arrange availability of food from basic material of fish and their processing result in sufficient amount and preservation power is long so can be income source.

Zein (2000) Food consumption is very determined by pattern of household expenditure itself at the fisherman group which the lower income group is very difficult to fulfill of family nutritional requirements because of low earning the orientation of the family in structure for the requirement of the food.

Pallav sengupta and sobhana sahoo (2011) infers that fishermen have more physical fitness (cardiovascular fitness) and muscle mass, but less fat percentage than sedentary population. But with physical strength and cardiovascular fitness more endurance is required for better health of young fishermen.

Pal.B et.al., (2010) stated that some notable elements of living conditions such as food, shelter, health etc. matters much more than the conventional income or calorie deficiency. Commonly, the social scientists equate poverty with income or calorie deficiency which may not be the case as is evident from this study.

OBJECTIVES

- To assess the Food and Nutrient intake of the fishermen population among different age, gender and physiological group in the Maritime region of Puducherry.
- To assess the Nutritional status of the fishermen population region (Puducherry) in terms of Anthropometric and Prevalence of Clinical signs of Nutritional deficiencies.

- To assess the prevalence of morbidity during the previous fortnight among fishermen population in Puducherry Union territory.
- To assess the Knowledge, Attitude and Practice on the importance of Nutrition, sanitation and hygiene and common diseases among the adult fishermen.

Methodology

Study Design

It is the Cross sectional study carried out by adopting stratified random sampling procedure in Puducherry.

Sample frame

Based on pisco –climatic criteria , the Government of Puducherry divides each region into several strata Each stratum consisting of the population mentioned in table below

Table I

Total population of fishermen in Puducherry union territory

Region	Total of population	Fishermen population	
		Marine population	Inland population
Puducherry	946,600	51,350	9270
Karaikal	200,314	17265	1197
Yanam	55,616	2280	10100
Mahe	41,934	4000	-
	Total	74895	20567

The fishing population Puducherry is divided by grouping contiguous villages having similarly fishing pattern and population density .For the current survey the fishing population of Puducherry would only be taken. The survey would adopts two stage stratified random sampling procedure in which the village formed the first stage units, while the households form the second stage units selection of area. In each selected stratum 3 % of populations will be randomly selected from the list of areas marked as fishermen population by the Government of Puducherry. Each stratum consisting of the 3% population mentioned in Table II.

Table II

Total population of fishermen in Puducherry region

Sl.No	Name of the village	Population	3 % of population
1.	Kanagachetikulam	1155	35
2.	Periyakalapet	3850	116
3.	Chinnakalapet	2185	67
4.	Pillachavady	1965	59
5.	Solai nagar	4170	128
6.	Vaithikuppam	3930	118
7.	Kurusukupam	2995	90
8.	Vamabakerrapalayam	8300	250
9.	Periyaverampatinam	10260	308
10.	Chinnaverrampatinam	835	25
11.	Pudukuppam	1740	52
12.	Nallavadu	3435	104
13.	Pannithtu	2650	80
14.	Narambai	1905	58
15.	Moorthikuppam	1975	60
	Total	51350	1540

(source :Fisheries and Fishermen Welfare Department)

Sampling procedure

Socio –economic and demographic data

Socio- economic and Demographic profile will be collected from all the selected population covering the maritime region of Puducherry Union Territory.

Nutritional Status

Nutritional status of the selective individuals will be covered for Anthropometric, Clinical examination and collection of the morbidity of previous fort night.

Diet Survey

Twenty four hour recall method of diet survey will be carried out in ten percentage (10%) of the sample to assess the Food and Nutrition intake household as well as individual level.

Computation of sample size for diet related chronic diseases

Hemoglobin levels

Assuming a prevalence of anemia of 50% among adult men NPNL women (≥20 years)[1], 95 per cent confidence interval and a relative precision of 10 per cent a sample size of about 400 individuals in each of the gender was arrived at, for the estimation of hemoglobin levels .Therefore, 5 adult men and women each in the age group of ≥20 years will be covered for the purpose covered for the diet survey in the sampling population.

Fasting blood glucose levels

Earlier studies carried out in India have revealed that the overall prevalence of diabetes mellitus in the rural areas was about 5%[2] .Thus ,assuming a prevalence of 5% of diabetes mellitus with 95% confidence interval and 20% relative precision ,a sample adults of ≥20 years would be required for each gender for the estimation of fasting blood glucose levels .

Hypertension

Studies carried out in the past have shown the overall prevalence of hypertension among the rural adults of 20 years and above was about 8 - 10%[3].By assuming the prevalence of hypertension as 8% and confidence interval and 20% relative precision ,the sample size required for each state was computed as 1,104 adults for each gender. Therefore ,from each village, a minimum of 15 adult men and women each were required to be covered for the measurement of blood pressure .

Investigations

Household socio-economic and demographic particulars

Household socio-economic and demographic particulars, such as family size, type of dwelling, age/sex/occupation, income and literacy level of all the individuals, household possession of agricultural land, live stock, agricultural production, etc. will be collected from all the selected households selected for the survey.

Nutrition Assessment

All the available individuals from the selected sampling will be covered for the assessment of the nutritional status in terms of anthropometry and clinical examination. The clinical examination would be done with the help of a Physician.

Anthropometry

Anthropometry measurements such as height, weight, mid upper arm circumference and fat hold thickness at triceps will be taken on all the individuals in the selected population by adopting standard procedures. In addition, waist and hip circumferences will also measured on aduits of ≥20

years of age (excluding pregnant women) all the measurements will be taken by using standard equipment and procedures[4].

Clinical Examination

All the individuals covered for Anthropometry will be examined for presence of clinical signs of nutrition deficiencies.

Estimation of Haemoglobin

Procedure

20 µl of finger prick blood sample was collected using fixed volume Finn pipettes with disposable tip, by standard procedures and transferred into a test tube containing 5 ml of Drabkin's reagent. The haemoglobin will estimated using a photoelectric digital colorimeter by cyanmethaemoglobin method[5].

Diet Survey

Food intakes of the individuals were assessed by carrying out 24-hour recall method of diet survey in every alternate household (10 HHs) covered for nutrition assessment[6].

History of Morbidity

Information on morbidity such as fever, dysentery, diarrhoea and acute respiratory infections during the preceding 15 days was collected among all the individuals covered for Nutrition Assessment.

Chronic Diet related morbidities

Measurement of blood pressure

Systolic and diastolic blood pressure will be measure in recumbent posture using mercury sphygmomanometer on all the available adults of ≥20 years covered for 3 % of fishermen population. The measurements were made for three consecutive times, with a gap of 5 minutes between measurements.

Estimation of Fasting blood glucose levels

This investigation is carrying out in fishermen population. Fasting Blood glucose levels will be measureafter a 12 hours fast, using portable Glucometer (*Boots*) among the adults of ≥20 years covere for anthropometry and clinical examination. For this purpose, all the selected adults were contacted on the previous day, and will be instructed to maintain 12 hours fasting before blood glucose level is estimate around 7 am on the next day.

Waist circumference

Waist circumference is measure with a fiber reinforced plastic tape at point mid way between the lowest margin of the ribs and the iliac crest.

Hip Circumference

Hip circumference is measure with the tape a point of maximum protuberance of buttocks.

Data analysis

Diet and nutritional status

Food and Nutritional intakes

The average daily intake of different foods by individuals will be calculated according to different age/gender/physiological status and physical activity groups and will be compared with recommend least cost balanced diets provide in Recommend dietary intakes for Indian(1981)[7].The average nutrient intakes will be calculated by using food composition tables in Nutritive value of Indian Foods[8]. The median as well as mean, Standard deviation intakes of various nutrients will be computed and compared with Recommended Dietary Allowances for Indians (1991)[9] suggested by the ICMR .In addition, the average intake of various foods and nutrients (per CU/day)at the house hold level will also be computed .

Protein /Calorie Adequacy Status of Individuals

The individuals will be categorized in to different groups based on the protein/calorie adequacy status according to age/sex/physiological groups and activity. The protein and energy requirement curves are assumed to follow Gaussian distribution, with a coefficient of variation of 15%. The Expert Committee of Indian Council of Medical Research (ICMR)has suggested "requirements" for energy as the "recommended allowances", while in the case of protein, the "allowances" corresponded to Mean ±2 SD of the "requirements". Therefore, for defining the energy/protein adequacy status, 70% of requirements (Requirements-2SD)[9]will be used as cut-off points for different age/sex/physiological and activity groups.

Protein /Calorie Adequacy Status of households

The households will be categorized according to the protein/calorie adequacy status by considering average consumption of protein/calorie per Consumption Unit (the requirements of reference man is considered as one Unit) per day and by adopting similar procedure described above. However, the cut-off level used to define the adequacy status of a household is

"Requirement-2 SE", since the intakes at HH level are mean values, unlike in the case of individuals. It may also be mentioned here that the SE differ between HHs, since the total CUs for each of the HHs are variable.

Anthropometry

Mean height, weight, mid-upper arm circumference and fat fold thickness at triceps will be calculated according to age group and gender.

Preschool Children

The <5-year children will be categorized according to their nutritional status by different Classification as described below:

Gomez Classification[10]

Weight for age (% of NCHS Standard)	**Nutritional Grade**
≥90	Normal
75 - 89.99	Grade I (Mild undernutrition)
60 - 74.99	Grade II (Moderate undernutrition)
< 60	Grade III (Severe undernutrition)

The children will be distributed according to Gomez grades by comparing with NCHS standards[11].

IAP Classification[12]

The 6-59 months children will be distributed according to IAP classification as follows using Harvard standards, to help comparison with ICDS data, in different States.

Weight for age (% of Harvard Standard)	**Nutritional Grade**
≥80	Normal
70 – 79.99	Grade I Undernutrition
60 – 69.99	Grade II Undernutrition
50 – 59.99	Grade III Undernutrition
< 50	Grade IV Undernutrition

Standard Deviation (SD) Classification [13]

The World Health Organization recommends use of SD classification to categorize 1-5 year children into different nutritional grades. Therefore, the percent distribution of preschool children according to weight for age, height for age and weight for height using NCHS reference values will be done as described below:

SD Classification	**Weight for age**	**Height for age**	**Weight for Height**
≥Median – 2SD	Normal	Normal	Normal

Median –2SD to ≥Median–3SD	Moderate undernutrition	Moderate stunting	Moderate wasting
< Median–3 SD	Severe undernutrition	Severe stunting	Severe wasting

School age Children and Adolescents

Children of 6-9, 10-13, and 14-17 year age groups will be distributed according to Weight for age, Height for age and Weight for Height by SD classification using NCHS standards. In addition, 10-13 and 14-17 year age group of children will be distributed according to nutritional status based on Body Mass Index (BMI) by using the NHANES age/gender specific BMI centile values, as mentioned below [14]

BMI Age centiles	**Nutritional grade**
< 5th centile	Undernutrition
≥5th - < 85th centile	Normal
≥85th - < 95th centile	Overweight
≥95th centile	Obesity

Adults

Body Mass Index (BMI)

The nutritional status of adults will be assessed according to BMI based on James et al [15]and WHO classification[16] as follows:

BMI	**Nutritional Grade**	**Classification**
<16.0	III degree CED	**James et al**
16.0 – 17.0	II degree CED	
17.0 – 18.5	I degree CED	
18.5 – 20.0	Low Normal	
20.0 – 25.0	Normal	
25.0 – 30.0	Over weight	
≥30	Obesity	**WHO**
20.0-23.0	Normal	
23.0-30.0	Over weight	
30 – 35	Obesity I	
35 – 40	Obesity II	
≥ 40	Obesity III	

CED: Chronic Energy Deficiency

Waist Circumference

Adult men with waist circumference ≥102 cm and adult women with ≥88 cm will be considered as having abdominal obesity[17].

Waist hip ratio (WHR)

Adult men with waist hip ratio of ≥0.95 and women with ≥0.80 will be considered as having abdominal obesity[18].

Anaemia

The criteria suggested by the WHO[19] will be used to define the extent and degree of anaemia. The cut off values suggested for men and NPNL women (≥20 years) by the WHO are presented below:

Gender	Normal	Degree of Anaemia (g/dL)		
		Mild	Moderate	Severe
Men	≥13	10-13	7-10	<7
Women	≥12	10-12	7-10	<7

Hypertension

Subjects with systolic blood pressure of ≥140 mmHg and /or diastolic pressure of ≥90 mm Hg were considered as hypertensive (WHO-TRS 862, 1996[20]&JNC Criteria[21]VII). In the present study, the average of these consecutive reading of blood pressure will be considered to categorizing the individuals in the different grades of hypertension as follows

Grades of Hypertension	Blood pressure(mm/Hg)	
	Systolic	Diastolic
Normal	<120	<80
Pre-hypertension	120-139	80-89
Stage 1 Hypertension	140-160	90-99
Stage 2 Hypertension	≥160	≥100

Diabetes Mellitus

The following ICMR/WHO cut-off levels were used to categorize individuals with Diabetes Mellitus/ Hyperglycaemia (DM/HG) [22].

Category	Fasting blood glucose (mg/dl)
Normal	<110
Hyperglycemic	110 –125.99
Diabetes Mellitus	≥126

References:

1. National Family Health Survey II (1998), International Institute for Population Sciences, Bombay.