



ECONOMIC ANALYSIS OF FOOD SECURITY AND NUTRITION IN SATARA DISTRICT, MAHARASHTRA

¹ Dr. M.S. Deshmukh, ² Punam Prakash Pawar

¹ Professor, ² Research Scholar

^{1,2} Department of Economics, Shivaji University, Kolhapur (MH)

Abstract:

The present study measure the food security and nutritional status of selected households in Satara district, Maharashtra. The zero hunger, better health, and well-being are major indicators of Sustainable Development Goals. These goals will be achieve when we able to provide food security to every household and individual. We have selected total 420 households for the present study. In the study area, out of 2137 family members of sample respondents, 24.15 percent are too thin, 56.76 percent are normal, 16.19 percent are overweight and 2.9 percent are obese. The prevalence of underweight and obese is high in children compare to men and women. The good health (Normal BMI) is found in children (62.25 percent) than men (52.18 percent) and women (58.99 percent). The prevalence of overweight is high in men than children and women. Similarly, the prevalence of obese is high in children (3.68 percent), followed by men and women in sample households. It found that, more than fifty percent of sample household's (56.76 percent) nutrition level is good and healthy. It means that, food available, access, stability and utilisation is high level, but food haven't nutrient. The public distribution system has positively affected on food security of below poverty line households in study area of Satara district.

Key Words: Food Security, Nutrition, Sustainable Development, Zero Hunger

I. INTRODUCTION:

Food and nutrition security are the main indicators of a healthy, secure & prosperous human life. Food that we eat in daily life contains nourishing substances called nutrients. There are five main factors in nutritional foods that are carbohydrates, proteins, fats, vitamins and minerals. Food is classified as cereals, pulses, nuts, fruits, milk & milk products and eggs, flesh food fish and meat. The second goal of sustainable development goals is 'zero hunger- pledges to end hunger, achieve food security, improve nutrition and promote sustainable agriculture'. The major objective of this goal is to improve food access to all, end malnutrition with childhood stunting and wasting and improve agricultural sustainability.

Agriculture sector is the main pillar of food & nutrition security. In 2018-19, total food production of India was estimated at 284.95 million tonnes which is than the previous record production of food grain in 2012-13 (GoI, 2019). In the world, India is first rank in largest producer in milk, pulses & jute, and second rank in the largest producer of rice, groundnut, wheat, sugarcane, fruit, cotton and vegetables in 2017-18. It is also one of the leading producers of spices, fish and livestock. India contributed nearly 25 percent in food production, 27 percent in consumption and 14 percent importer of pulses in the world (FAO, 2019). However, India is facing malnutrition among children (below 5 years age). India has the highest number of stunted and wasted children with 46.6 million and 25.5 million respectively in the world and nearly a third and half of all stunting and wasting children worldwide during 2018 (Claydon, 2018). The statistical data of National Family Health Survey-4 (NFHS) 2015-16 shows that, in the Satara district of Maharashtra, the nutritional status of children and adults in Satara district was very low in Western Maharashtra due to poor food consumption, less food availability, overpopulation, weak income source and absence of knowledge. The present study focuses on estimation of household level food security and nutritional level in the Satara district.

II. OBJECTIVES OF THE RESEARCH STUDY:

1. To measure the expenses on the food of selected households in the sample area.
2. To construct the food security indices of selected households in the Satara district.
3. To measure the nutritional level of children and adults in the sample area.

III. RESEARCH METHODOLOGY AND DATA BASE:

The present study is based on both primary and secondary data. Primary data were collected through structured questionnaire and field observations from seven blocks of Satara district. On the basis of cluster sampling approach the total blocks of Satara district were grouped in to three clusters, i.e. hilly region, fertile region and drought prone region. The researchers have selected 420 households through convenient sampling method. The households in each block were selected in proportion to the total household number of the region. The duration of primary data is limited to the period of 2020.

VI. RESULTS AND DISCUSSION:**1. FOOD EXPENSES OF HOUSEHOLDS IN SATARA DISTRICT:**

The household's expenses on food are collected on monthly basis before survey (last 30 days). All food products is classified into eleven major food groups. The table 1 shows the region wise household's food expenditure. Consider the region wise spending on food, in hilly region, the high expenses on milk and dairy products is 715 (40.01 percent), followed by meat, egg and fish 335 (18.75 percent), cereals 260 (14.55 percent) and oil & fat products 132 (7.39 percent). The households from hilly region spend less on condiments/ spices food products. The jowar/ sorghum food consumption is high in cereals food category and moong in pulses food category. Milk is consumed daily by family members and it is used in prepare tea, coffee and dairy products. Therefore, spend on milk and dairy products is high in all food products. Similarly, in fertile region, the highest expenditure on milk and dairy products is 766 (36.63 percent), followed by meat, egg and fish 343 (17.74 percent), cereals 295 (15.26 percent) and oil & fat products 130 (6.73 percent). Likewise, in drought prone region, the household's expenses on milk and milk products is high and low in condiments/ spices. It is observed that, in all regions of Satara district, consumption of milk & dairy products and non-veg food item (egg, meat and fish) mostly high and common in households during study period. In addition, packaged/ processes food products more consume in hilly region and low in drought prone region. The household's expenses on food is highest in fertile region (1933), followed by hilly region (1787) and drought prone region (1765). Milk has all kind of nutrient ingredients which is better to health; households spend more income on it.

The food expenditure on cereals products is 271 (14.82 percent), pulses is 46.67 (2.55 percent), roots & tubers is 48 (2.30 percent), vegetables is 61 (2.63 percent), fruits is 46.33 (2.53 percent), milk & dairy products is 736.34 (40.27 percent), meat, fish & eggs is 332.67 (18.20 percent), oil is 130 (7.11), sweet 80.67 (4.41 percent), condiments is 34.67 (1.90 percent) and processed food products is 41 (2.24 percent). It means that, households expenses on food is high on milk and dairy products, followed by meat, fish & eggs, cereals and oil/ fat products in study area of Satara district during study period January 2020. The household's expenses on food is highest in fertile region (1933), followed by hilly region (1787) and drought prone region (1765). The average food expenses of households of Satara district is 1828.33 during study period 2020.

Table 1: Region wise household's food expenses in Satara district (last 30 Days)

Sr. No	Food Products	Region			
		Hilly	Fertile	Drought Prone	Average
1	Cereals	260 (14.55)	295 (15.26)	258 (14.62)	271.00 (14.82)
1.1	Jowar	148 (8.28)	152 (7.86)	146 (8.27)	148.67 (8.13)
1.2	Wheat	60 (3.36)	72 (3.72)	64 (3.63)	65.33 (3.57)
1.3	Rice	42 (2.35)	55 (2.85)	36 (2.04)	44.33 (2.42)
1.4	Other- Maize, Bajara, Nachani	10 (0.56)	16 (0.83)	12 (0.68)	12.67 (0.69)
2	Pulses	36 (2.01)	56 (2.90)	48 (2.72)	46.67 (2.55)
2.1	Moong	14 (0.78)	22 (1.14)	18 (1.02)	18.00 (0.98)
2.2	Tur	11 (0.62)	17 (0.88)	16 (0.91)	14.67 (0.80)
2.3	Udid	06 (0.34)	10 (0.52)	08 (0.45)	8.00 (0.44)
2.4	Other pulses-	05 (0.28)	07 (0.36)	06 (0.34)	6.00 (0.33)
3	Roots & Tubers (Potato, Carrot, Radish, Other Roots)	49 (2.74)	53 (2.74)	42 (2.38)	48.00 (2.63)
4	Vegetables	61 (3.41)	66 (3.41)	56 (3.17)	61.00 (3.34)
5	Fruits	47 (2.63)	52 (2.69)	40 (2.27)	46.33 (2.53)
6	Meat, Fish & Eggs	335 (18.75)	343 (17.74)	320 (18.13)	332.67 (18.20)
7	Milk & Dairy Products	715 (40.01)	766 (39.63)	728 (41.25)	736.34 (40.27)
7.1	Milk	680 (38.05)	724 (37.45)	698 (39.55)	700.67 (38.32)
7.2	Dairy Products (Ghee, Curd, Sour, Yogurt, Cheese)	35 (1.96)	42 (2.17)	30 (1.70)	35.67 (1.95)
8	Oil/ Fat / Butter (Vegetable Oil, Palm Oil, Margarine, Other Fats/Oil)	132 (7.39)	130 (6.73)	128 (7.25)	130.00 (7.11)
9	Sweet (Sugar, Honey, Candy, Pastries, Cakes and Other Sweets)	79 (4.42)	83 (4.29)	80 (4.53)	80.67 (4.41)
10	Condiments/ Spices (Tea, Coffee, Salt, Spices	34 (1.90)	40 (2.07)	30 (1.70)	34.67 (1.90)

11	Other (Packaged/ Processed Food)	39 (2.18)	49 (2.53)	35 (1.98)	41.00 (2.24)
	Total Expenses	1787 (100.00)	1933 (100.00)	1765 (100.00)	1828.33 (100.00)

Note: Figures in the parentheses indicate the percentage of the total

Source: Field Survey 2020

2. FOOD SECURITY MEASUREMENTS:

2.1 Food Consumption Score (FCS):

Food Consumption Score (FCS) is used to measure caloric intake and diet quality at household level. FCS is a composite score based on dietary frequency, food frequency and relative nutrition importance of different food groups. FCS is the consumption frequency of foods/ food groups of households over the past 7 days. The FCS is a weighted sum of food groups. The score for each food group is calculated by multiplying the number of days the commodity was consumed and its relative weight. FCS has classified into three main categories. The poor consumption category is lies between 1-28 score, borderline consumption category lies between 29-42 score, and acceptable consumption category lies between 43-112 score.

Figure 1: Region wise food consumption score of households in study area

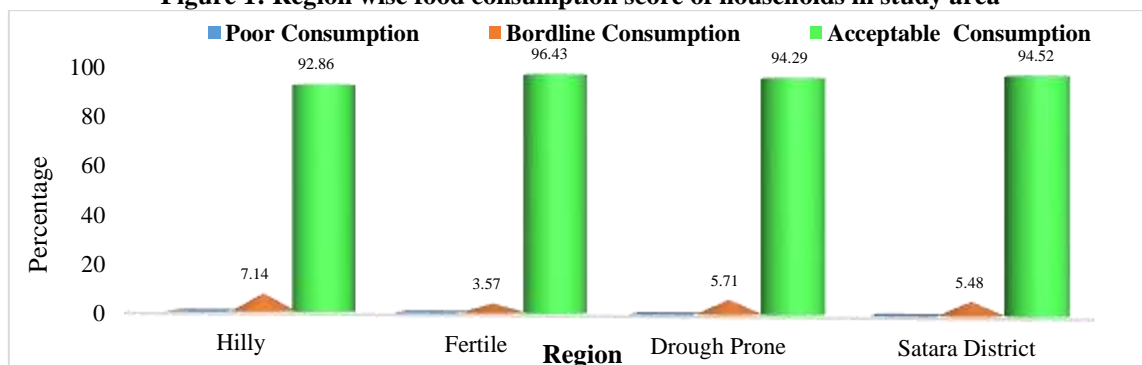


Figure 1 shows region wise food consumption score in study area of Satara district. The food consumption score of Satara district is 82.33 which is come under acceptable consumption score category. Food consumption score is high in fertile region with 88, followed by hilly region (82) and fertile region (77). Table 5.17 show that, out of total sample households, the food consumption score of 94.52 percent households (397) is between 43 to 112 which shows the acceptable consumption level and rest 5.48 percent household's (23) score is 29 to 42 to show borderline consumption. There is no household found in study area which food consumption score is poor. The household's food consumption score is high in fertile region (96.43 percent) followed by drought prone region and hilly region. The highest number of household's found in hilly region (7.14 percent) of Satara district which consumption score is borderline level. Researcher has observed that, the consumption of meat, fish and eggs is high in both drought prone and fertile region than hilly region. Similarly, it is found that, the consumption of fruit food group is low in drought prone region in Satara district.

2.2 Household Dietary Diversity Scale (HDDS):

HDDS is a proxy measure for household's food access. Dietary diversity signifies the number of different foods or food groups consumed over a given reference period. Dietary diversity scale is similar to the FCS, but usually with a 24-hour recall period without frequency information or weighted categorical cut-offs. HDDS shows the number of different foods consumed over past 24 hours recall period.

Table 2: Region wise dietary diversity scale of selected households (last 24 hours)

Sr. No	Dietary Diversity	Scale Range	Region			Satara District
			Hilly	Fertile	D. Prone	
1	Low Dietary	1 - 3	0	0	0	0
2	Medium Dietary	4 - 6	08 (5.71)	04 (2.86)	12 (8.57)	24 (5.71)
3	Good Dietary	7 - 8	132 (94.29)	136 (97.14)	128 (91.43)	396 (94.29)
	Total		140.00 (100.0)	140.00 (100.0)	140.00 (100.0)	420 (100.0)

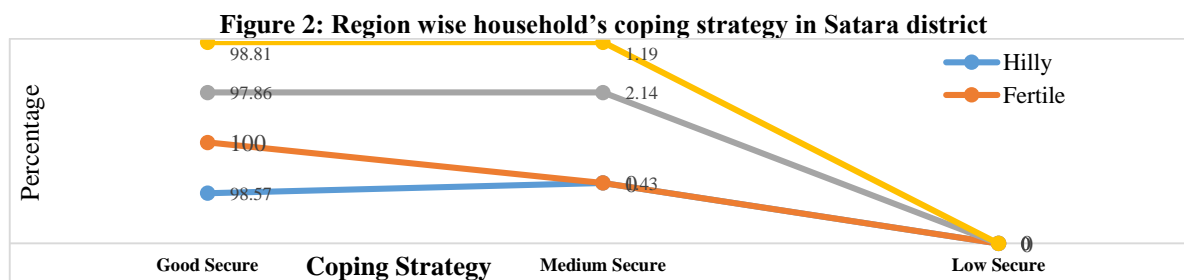
Note: Figures in the parentheses indicate the percentage of the total number of households

Source: Field Survey 2020

Table 2 indicate region wise dietary diversity scale of sample households in Satara district. There are 94.29 households (396) have good level dietary over the last 24 hours of survey. Rest 5.71 percent households (24) have medium level dietary diversity which is high in drought prone region (8.57 percent) and low in fertile region (2.86 percent). Nobody households found which dietary diversity is low level. The number of good dietary diversity of households is high in fertile region (97.14 percent) and low in drought prone region of Satara district. The consumption level of fruit food group is low in drought prone region compare to other region during survey period. Therefore, the most of households have medium level dietary diversity which is high in drought prone region. HDDS indicate that, 94.29 percent households have full access of food in the study area. HDDS of Satara district is 5.33 which indicate household's dietary is medium level during the study period. The HDDS is high in fertile region (6), followed by hilly region (5) and drought prone region (5) in sample households. Most of households reported that, they cannot consume fruit food category products, non-veg food item and packaged/ processed food products over the last 24 hours of survey period.

2.3 Reduced Coping Strategy Index (rCSI):

rCSI is used for measure consumption behaviour of households. Livelihoods are harmfully affected by a natural or man-made crisis; households may adopt various strategies which are not adopted in a normal day-to-day life. rCSI is based on the same short list of five food-related coping strategies applied during the past seven days and the same severity weights. rCSI has classified into three categories namely low, medium and high secure. The rCSI value of 10 to 56 is considered 'Low Secure', 4 to 9 considered 'Medium Secure' and 1 to 3 considered 'High Secure' category.



In study area, rCSI value of Satara district is 2 which indicate the coping strategy is good secure (figure 2). rCSI value is high in drought prone region (3) and low in fertile region. It means that, the coping strategy is good in fertile than other region. Most of households are using 'rely on less preferred and less expensive foods' coping strategy during abnormal day life. There are 415 household's (98.81 percent) coping strategy is securely good and rest 05 household's (1.19 percent) is medium level. It means that, most of households have adopted various strategies which are not adopted in a normal day-to-day life. It is indicate that food is available and access to households in study area of Satara district. Most of households belongs to drought prone region which coping strategy is medium level for overcome on food crises.

2.4 Household Hunger Scale (HHS):

Household Hunger Scale captures the most extreme manifestations of insufficiency. HHS is constructed around three questions about perceptions of a household on varying degrees of hunger by the number of times a household has experienced hunger within past 30 days.

Table 3 shows region wise household's hunger scale. There are nobody households suffer from food crises. All selected households in Satara district have little to no hunger scale. The food grain production, public distribution system, availability of markets, purchasing power and coping strategies are positively affected on food security in sample area of Satara districts during study period 2020. In Satara district, the HHS of sample households is 1 during study period. It means that, in study area, hunger scale of selected households is come under little to no hunger scale category. The all households have food availability, access, stability and utilisation during study period.

Table 3: Region wise households hunger scale in Satara district (last 30 days)

Sr. No	Hunger Scale	Range	Region			Satara
			Hilly	Fertile	D. Prone	
1	Little to No Hunger	0 - 1	140 (100)	140 (100)	140 (100)	420 (100)
2	Moderate Hunger	2 - 3	0	0	0	0
3	Severe Hunger	4 - 6	0	0	0	0
	Total		140 (100.0)	140 (100.0)	140 (100)	420 (100.0)

Note: Figures in the parentheses indicate the percentage of the total number of households

Source: Field Survey 2020

3. NUTRITIONAL STATUS OF RESPONDENTS IN SATARA DISTRICT:

The nutritional status of children (5-14 years) and adults (above 15 years) is calculated by using anthropometric data on the height and weight. These data are used to calculate four measures such as underweight/thin, normal, overweigh and obese by using BMI. Table 4 indicate the nutritional scenario of sample respondents in the study area of Satara district.

Table 4: Nutrition status of respondents in Satara district

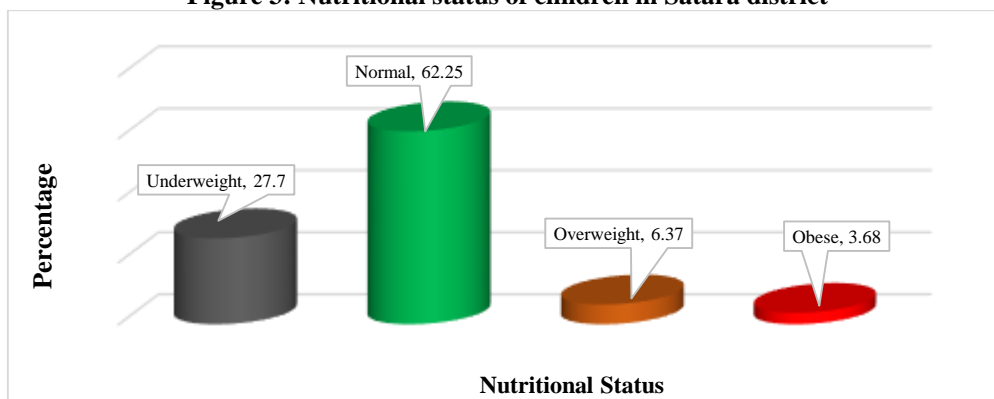
Sr. No	Nutritional Status	Children (5-14 age)	Men (15 & above age)	Women (15 & above age)	Total
1	Underweight (BMI<18.5)	113 (27.70)	192 (21.45)	211 (25.30)	516 (24.15)
2	Normal (BMI <24.9)	254 (62.25)	467 (52.18)	492 (58.99)	1213 (56.76)
3	Overweight (BMI >25)	26 (6.37)	207 (23.13)	113 (13.55)	346 (16.19)
4	Obese (BMI>30)	15 (3.68)	29 (3.24)	18 (2.16)	62 (2.9)
	Total	408 (100.0)	895 (100.0)	834 (100.0)	2137 (100.0)

Note: Figures in the parentheses indicate the percentage of the total number

Source: Field Survey 2020

3.1 Nutritional Status of Children (5-15 years) in Satara District:

Figure 3: Nutritional status of children in Satara district



The percentage of children (5-15 years) classified as malnourished according to four indicators such as underweight, normal, overweight and obese in Satara district during 2020. Table 1.4 shows that, out of 408 children (5-14 years) of respondent’s family, 113 children (27.70 percent) are underweight, 254 children (62.25 percent) are healthy/normal weighted, 26 children (6.37 percent) are over weighted and 15 children (3.68 percent) are obese in sample area of Satara district. There are 27.70 percent of children are underweight, which indicates that they have which takes into account both chronic and acute under nutrition. There were 10.05 percent of children are overweight and obese in Satara district.

3.2: Nutritional Status of Adults in Satara District:

Table 1.5 reveals that, there are 192 men (21.45 percent) are the prevalence of underweight, 467 men (52.18 percent) are normal/ healthy weighted, 207 men (23.13 percent) are overweighted, and 29 men (3.24 percent) are obese. Similarly, in women category, 211 women (25.30 percent) are underweight, 492 women (58.99 percent) are healthy/ normal weighted, 113 women (13.55 percent) are overweight and 18 women (2.16 percent) are obese. It means that, the prevalence of thin among women (25.30 percent) is high than men (21.45 percent) in study area of Satara district (Figure 4).

Figure 4: Nutritional status of adults in Satara district

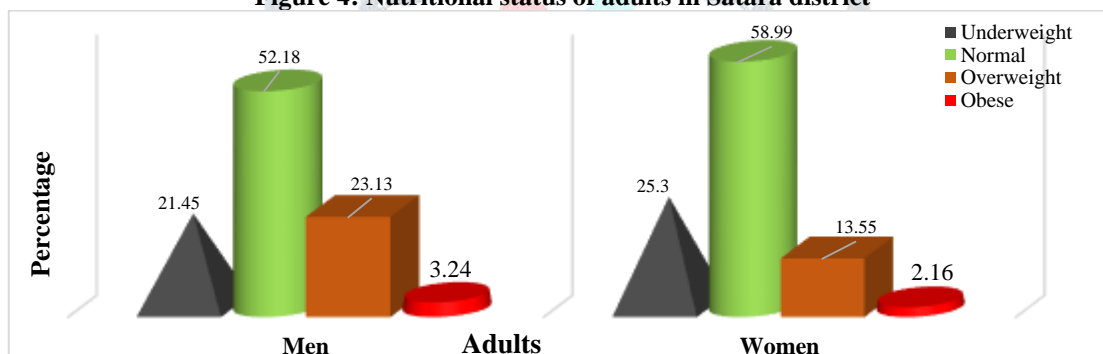
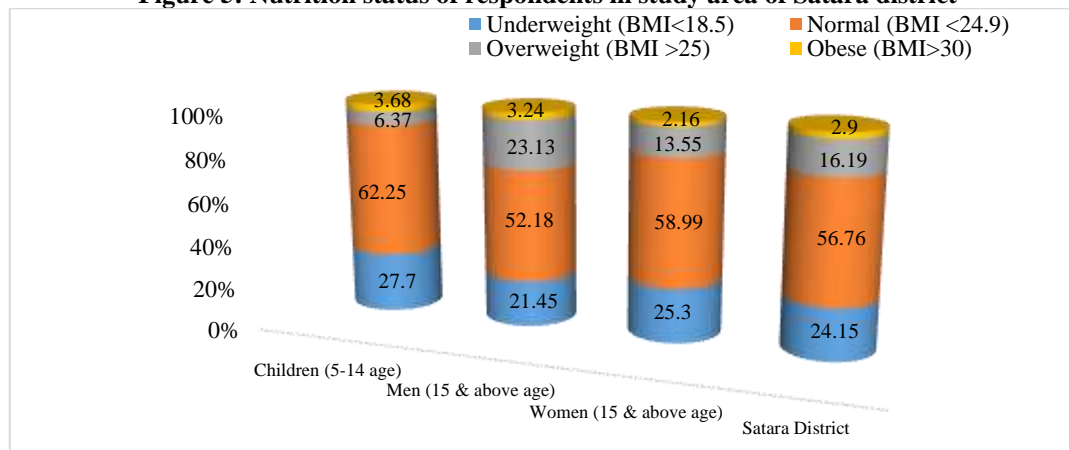


Figure 5 indicate that, out of 2137 family members of sample respondents, 24.15 percent are too thin, 56.76 percent are normal, 16.19 percent are overweight and 2.9 percent are obese. The prevalence of underweight and obese is high in children compare to men and women. The good health (Normal BMI) is found in children (62.25 percent) percent) than men (52.18 percent) and women (58.99 percent). The prevalence of overweight is high in men than children and women. Similarly, the prevalence of obese is high in children (3.68 percent), followed by men and women in sample households. It found that, more than fifty percent of sample household’s (56.76 percent) nutrition level is good and healthy. They have better access and utilise food on time to time.

Figure 5: Nutrition status of respondents in study area of Satara district



3.3 Region wise Nutritional Status of Respondents in Satara District:

Table 5: Region wise nutritional status of respondents in Satara district

Sr. No	Nutritional Status	Region			Satara District
		Hilly	Fertile	Drought Prone	
1	Underweight	174 (24.20)	160 (22.44)	182 (25.82)	516 (24.15)
2	Normal	396 (55.08)	381 (53.44)	436 (61.84)	1213 (56.76)
3	Overweight	126 (17.52)	141 (19.78)	79 (11.21)	346 (16.19)
4	Obese	23 (3.20)	31 (4.35)	8 (1.13)	62 (2.9)
	Total	719 (100.0)	713 (100.0)	705 (100.0)	2137 (100.0)

Note: Figures in the parentheses indicate the percentage of the total number

Source: Field Survey 2020

Table 5 shows the region wise nutrition status of selected household's family member in study area. The prevalence of underweight is high in drought prone region with 25.82 percent followed by hilly region (24.20 percent) and fertile region (22.44 percent). Similarly the prevalence of obese is higher in fertile region (4.32 percent) than hilly region and drought prone region. The overweight situation among family members is low in drought prone region (11.21 percent) compare to hilly region (17.52 percent) and fertile region (19.78 percent). The nutritional level is healthy in drought prone region than fertile and hilly region. Because of, consumption of cereals and pulses high in drought prone region than other regions of Satara district. In addition, consumption of the processes/ packed food is low in drought prone region compare to hilly and fertile region. Finally, it is found that, in drought prone region, the nutrition level of family members is healthy in drought prone region than fertile and hilly region of Satara district. There are 61.84 percent respondents have normal weight in drought prone region which have normal weight.

4. FOOD SECURITY INDICATORS AND NUTRITION STATUS OF SAMPLE HOUSEHOLDS IN SATARA DISTRICT:

Table 6: Food security indicators and nutrition status of sample households in Satara district

Sr. No	Food Security		Nutrition Status (%)		
	Indicator	Results	Thin	Normal	Overweight/Obese
1	Food Consumption Score	Acceptable Consumption	24.15	56.76	19.09
2	Household Dietary Diversity Scale	Good Dietary			
3	Reduced Coping Strategy	Secure Strategy			
4	Household Hunger Scale	Little to No hunger			

The food security indicators of sample households and nutritional status of family members of selected households compare in table 6. The study reveals that, sample household's food consumption score is acceptable level, dietary diversity scale is good level, reduced coping strategy is secured and hunger scale is no hunger level found in study area. But consider the nutritional level of family members of sample households, there are 24.15 percent respondents are underweight and 19.09 percent are overweight and obese. Food security of household's level is high, but family member suffer various nutritional problems. It means that, food available, access, stability and utilisation is high level, but food haven't nutrient. The chemical farming provide food to all, but not sufficient nutrient level. Food is available in household at optimum level, but its distribution is not equal among family members. In addition, food is unavailable and insufficient quantities to every member of the family.

CONCLUSION:

The food grain production, public distribution system, availability of markets, purchasing power and coping strategies are positively affected on food security and nutrition level of sample area of Satara districts. In drought prone region, most of households suffer the less consumption such as fruits and processed food. The households in drought prone region highly consume cereals and pulses rather than other food production. Similarly, households in fertile and hilly region, more consume milk, dairy products and fruits than drought prone region. The public distribution system has positively affected on food security of below poverty line households in study area of Satara district. It is found that, the food security is secure in study area of Satara district during study period 2020. Consider the nutrition level among family members, nutrition level of children is better than men and women member. But prevalence of underweight and obese is high in children member and prevalence of overweight is high in men members of sample households in study area of Satara district. The chemical farming provide food to all, but not sufficient nutrient level. Food is available in household at optimum level, but its distribution is not equal among family members. Food is unavailable and insufficient quantities to every member of the family. Few important suggestions have been made on the basis of field work observations and interviewed of family members which has summarized as follows.

- The current food production system is based on conventional/ artificial inputs method. It is necessary to apply organic farming techniques or residue free farming techniques for produce high nutrient food. The organic production must be increased by the use of high yielding native varieties of seeds, compost manures, organic fertiliser, pesticides and modern irrigation facilities.
- Awareness about food and nutrition is necessary for a balanced diet and precautions against diseases. It's necessary to develop educational programs for increase public awareness about food security and nutrition. Government should introduce new subject of food and health in curriculum and start from school education. Therefore, awareness about food security and nutrition will develop in the students, farmers and consumers.
- Government, non-governmental organizations and social organizations should propagate the food, diet plan and nutrition among society.
- Medical extension services should reach the door of every household in both rural and urban areas.

- Making food available through universal public distribution systems at affordable prices to below poverty line households. In addition, government should supply high quality and quality of food through public distribution supply. It is necessary to increase food item in public distribution system for saffron ration card holders.
- Government should make new rules and regulations to maintain hygiene in public distribution centres.
- Promote personal and family hygiene, environmental awareness, sanitation, safe drinking water, food safety and basic health services.
- There is need to focus on certain specific food supplements for ensuring the nutrition security of individual, families and the community.

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