

# Effectiveness of Nutrition Education Program, and Dietary Pattern Assessment after COVID 19 First Wave among Farmers in Ramanathapuram District, Tamil Nadu, India

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## ABSTRACT

**Background:** Being active and adhering to a right dietary regime perpetuates physiological, psychological and social health of the individual. To ameliorate nutritional well-being at the time of Covid 19 especially among farmers still a challenge due to lack of awareness & nutrition education program. Farmers are prominent in our nation and source of dependent for safe food; they are unperturbed about their dietary pattern which effectuates illness, infection and diseases among farmers. Hence it is necessary to study about their dietary pattern, and educate those regarding safe eating practices, and to sustain good hygiene practices during Covid 19.

**Objectives:** The present study was conducted to elicit information regarding the socio demographic profile, medical history and dietary pattern of the farmers. To conduct and to analyze the effect of nutrition education program using the pretest and post test questionnaire. **Methodology:** This experimental research was conducted among one hundred and sixty farmers between 20 to 60 years of age residing in the villages of Ramanathapuram district - Tharakudi and Kokkarasankottai respectively using an Interview schedule. This study was conducted in the period of October 2020 to April 2021 after first wave hits India. Flex, Posters and Pamphlets were prepared and used as a tool for conducting Nutrition Education Program.

**KEYWORDS:** Farmers, Dietary Pattern, Eat right, Covid 19, MGNREGA, Nutrition Education Program

Culmination of Nutrition education program was live demonstration and distribution of Foxtail millet pongal and kabasura kudineer to the farmers as to ignite the importance of traditional millets consumption, locally available fruits and Zinc and Vitamin C rich foods in farmer's diet to combat the transmission of virus. Pre test and Post test questionnaire were used to assess the practice of eating right and to appraise the impact of nutrition education program. Statistical analysis 't' test was used to determine the significance of the nutrition education program. **Results:** Majority thirty five percent of the farmers aged above 50 and ninety-five percent of the farmers are re-using the oil which may induce affliction among farmers. It has been found that forty-nine percent of the farmers reported with knee & joint pain and twenty-six percent of the

farmers had hyper tension. Almost all the farmers are including cereals daily in their diet and Palm oil is the main source of oil which was used in their cooking widely beside sunflower oil. Live demonstration of Foxtail millet pongal and kabasura kudineer were administered. Group counseling and in matter of necessity, personal counseling was also given to the farmers. Result reveals that there is a significant difference ( $p < 0.05$ ) before and after the nutrition education program. **Conclusion:** Value of Traditional foods, consumption of fruits and vegetables has been re-recognized during the times of Covid -19. Nevertheless they don't give great significance to their dietary pattern, Nutrition Education Program was conducted to empower the farmers and to fill the knowledge gap in choosing the right foods based on their activity pattern.

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## INTRODUCTION

In India, as a saying goes “farmers are the backbones of our nation” 70% of the population depends on the agriculture for their survival. Agricultural households are considered to be lucrative in developing countries. In 1980, approximately 70% of the labor force in low-income developing countries was involved in the agricultural sector. (Inderjit Singh, et al., 1986) Since farmers come under heavy activity category it is pivotal for the farmers to follow a balanced diet plan in order to maintain growth and development and also build up their immune system. Research states that compared to urban areas, rural community have a greater possibility of preventable death, illness, and disability due to inferior social reasons such as poverty, lack of healthy meals, improper education, deprived access to safe potable water and sanitation. (Sundaraman T, et al., 2011)

India currently ranks 19th in suicidal rates worldwide (WHO, 2018). The statistical data shows that In India suicidal rates are increasing among farmers (Basu, D, et al., 2016) Due to devastation by the miseries caused by farming issues such as drought, bad debts, non-production of the crops, and exploitation by private money lenders, poor irrigation facilities, and lack of markets. Hence many governmental and non-governmental agencies are rendering aids to minimize the issues of farmer’s suicidal death (Chandrashekar, H.M, 2010). According to the Food and Agriculture Organization of United Nations, Agriculture and its associated sectors are the largest sources of livelihoods (70%) in India. Also India is one of the world’s largest and leading producers of crops such as rice, wheat, sugarcane, cotton, vegetables, and milk (FAO, India).

Poverty being one of the causes for malnutrition, this study aimed to educate safe eating pattern and protective measures to be taken during Covid 19 among farmers. Covid 19 had a notable impact in rural community especially among farmers. Malnutrition are due to the underlying factors such as inadequate dietary intake, food insecurity and over consumption of certain nutrients leads to non communicable diseases which is customary among farmers. As farmers are facing lots of difficulties such as high input cost, drought, unpredictable climatic situations, and unable to pay the debt in bank loan, socio-economic problems in agricultural activities it is essential to assess their dietary pattern, socio-demographic profile, and lifestyle pattern of the farmers. Majority of the people in the Ramanathapuram district were employed in agriculture and MGNREGA.

## OBJECTIVES OF THE STUDY:

- To elicit information regarding socio demographic profile, medical history and dietary pattern of the farmers in Ramanathapuram district using an interview schedule and to assess the food frequency pattern of the farmers.
- To conduct and to analyze the significant difference of nutrition education program using the pretest and post questionnaire.
- To throw insight and to demonstrate traditional foxtail millet pongal and importance of kabasura kudineer during Covid 19.

## MATERIALS AND METHODS:

In this experimental research one hundred and sixty farmers in the age group between 20 to 60 years of age from Tharakudi and Kokkarasankottai, Ramanathapuram district were selected for the study. An interview schedule was prepared and standardized to collect information such as socio demographic profile, medical history and dietary pattern of the farmers. The questionnaire was structured in English and interviewed in the regional language Tamil individually for 20 minutes. Food frequency questionnaire which includes consumption of cereal and cereal products, pulses and legumes, milk and meat products, fats, nuts and oil seeds, sugar and processed foods also were assessed to evaluate their dietary pattern in detail.

Group counseling and in matter of necessity, personal counseling is also given to the farmers. Live demonstration of Foxtail millet pongal and kabasura kudineer were administered. Audiovisual aids such as Flex, posters and pamphlet were prepared and distributed for the live demonstration and nutrition education program. Pre test and post test questionnaire was analyzed before and after the program to assess the impact of the nutrition education program. Collected data was coded and percentage analysis was carried out. Statistical analysis ‘t’ test was used to determine the significance of the nutrition education program using SPSS software.

## CONSENT OF THE STUDY:

Prior to the study, we were granted approval for the field research from the local authorities, encompasses village president and local hospital staff in the nutrition education program.

## RESULTS AND DISCUSSION

### I. SOCIO DEMOGRAPHIC PROFILE OF THE FARMERS

**TABLE: 1, Percentage Distribution of Age Group of farmers**

Age	Number	Percentage
20-25	5	3
25-30	4	2
35-40	30	19
40 – 45	44	28
45-50	21	13
50 – 60	56	35

Among 160 farmers, majority thirty five percent of the farmers are aged above 50. Twenty-eight percent of the farmers were between the age group of 40-45, and only five percent of the farmers are between the age group of 20-30 respectively. This shows that younger generation are less attracted towards agriculture may be due to the factors such as no employment guarantee, low income, lack of agricultural land and contemporary lifestyle pattern. If younger generation involves in agricultural practices, they may make a divergence in cultivation of crops to feed the nation and can reduce the extremity of unemployment and suicidal endeavor.

**TABLE: 2, Percentage Distribution of farmers Occupation**

Occupation	Number	Percentage
Agriculture	160	100
100-day scheme (MGNREGA)	65	41

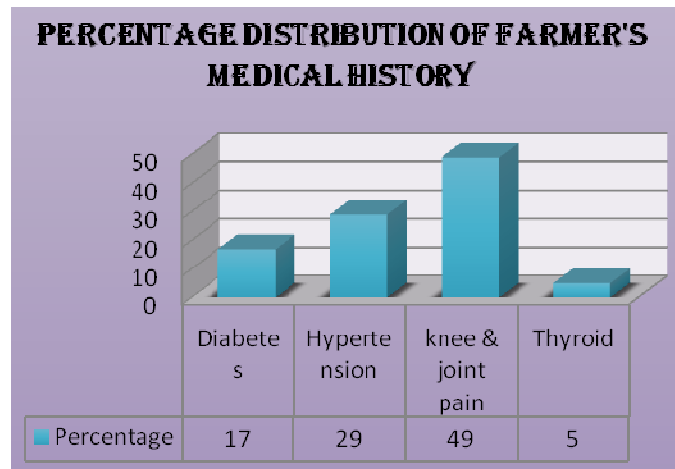
With regard to occupation as seen in table 2 that, regardless of their categorization as farmers; almost half of the farmers (41%) are also working in 100 days scheme (MGNREGA) which is offered by the central government especially during rain fed season. It comes under Mahatma Gandhi National Rural Employment Guarantee Act. Reason behind this may be due to unstable wages and also need to wait for a longer time for the crops to be harvested which is making them unable to meet their basic necessities and inability to support their children education.

The crops that are commonly grown in kokkarasankottai panchayat are cultivation of bullet red chilies, shallots, maize, sunflower, coriander, some of the summer seasonal vegetables such as squashes, bitter guard, bottle guard, and pumpkin. In tharakudi panchayat, taluk of kadaladi union cultivation of crops such as coriander, bullet red chili, peanuts, urad dhal, and vegetables like drumstick, brinjal, cucumber, and green leafy vegetables.

In Ramanathapuram district, as rain-fed agriculture is unlucrative, the farmers are heading towards agro-

based non-farming activities, which include manufacturing palm products and charcoal making for their survival. (Umamaheswari.L et al., 2001).

### II. MEDICAL HISTORY OF THE FARMERS



**Figure: 1, Percentage Distribution of Farmer's Medical History**

From Figure: 1, it has been inferred that among 160 farmers, almost half of the farmers (forty-nine percent) reported with knee & joint pain; and the reason may be as table 1 shows thirty five percent of the farmers are aged above 50, knee and joint pain will be the most common cause of all pain in late adulthood.

Twenty-nine percent of the farmers reported with hypertension. The root cause of hypertension is due to excessive intake of direct and indirect sodium foods, majority (66%) of the farmers are consuming pickles daily and (44%) of the farmers are consuming vadams/vathals daily. This may be the main cause of hypertension. This elevated hypertension may lead to cardiovascular diseases and renal diseases. (Weinberger M.H. 1996)

Subject to diabetes, seventeen percent of the farmers reported with diabetes mellitus. The consumption of rice and rice products, sugar was high in the farmer's dietary pattern; this may be one of the reasons for diabetes. Diabetes is affecting at a alarming rate in both urban and rural parts of our nation (Ramachandran et al., 2001).

### III. DIETARY PATTERN OF THE FARMERS

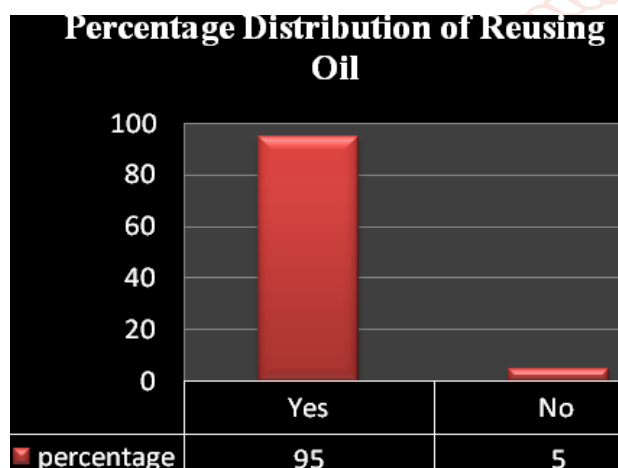
**Table 4: Percentage Distribution of Fat Used For Cooking Regularly by Farmers**

Fat used for cooking	Number	Percentage
Sunflower oil	103	64
Palm oil	106	66
Gingelly oil	35	22
Groundnut oil	14	9
Coconut oil	24	15



Table 4 shows that sixty-six percent of the farmers used palm oil for cooking, and the frequency for refined sunflower oil is sixty-four percent. Major reason for regular usage of palm oil (66%) may be it is available in the affordable cost and distributed by fair price shops regularly.

In 2008, to augment the availability of edible oils for low income category, the government has implemented a scheme to distribute imported edible oils to ration cardholders at subsidized prices (Narendra K. Arora, 2014). In contrast, palm oil was considered as unhealthy due to its higher content of saturated fatty acids. However, Poly unsaturated fatty acids content in palm oil did not adversely alter the plasma lipid profile. (Hornstra G et al., 1991) (Sundram K et al., 1992) (Ghafoorunissa G, 1995) Replacing the authentic vegetable oils with refined sunflower oil has not impeded the rising prevalence of heart diseases and diabetes in India. (Sircar S, et al., 1998)



**Figure: 2 Percentage Distributions of Farmers Reusing Oil**

From figure 2, we observe that among 160 farmers, ninety-five percent of the farmers are re-using the oil. Due to reasons such as financial issues, lack of awareness, and also it is expensive hence they are not interested to throw away the used oil. The oil which is used for deep frying foods items such as papads, vathal and to fry non vegetarain foods such as chicken and fish are re used in the households of farmers. Using fried oils persistently can produce constituents that will affect the quality of the food and also hazardous to human health (Sanibal and Mancini-Filho, 2004).

#### **Table: 6 Percentage Distribution of Farmers Food Frequency**

Food Frequency Questionnaires (FFQ) are a type of dietary assessment tool attempts to analyse an individual's regular eating pattern by querying the frequency at which the respondent food items

consumption based on a predetermined food checklist. Food lists vary according to the culture, therefore FFQs need to be adopted, standardised and validated for use in different circumstances (Thompson & Subar, 2013).

Food frequency pattern of farmers are discussed below:

#### **Cereals and cereal products:**

Consumption of cereals among farmers is high and almost all the farmers are including rice daily in their diet (100%), consuming wheat on monthly basis and millets on monthly basis,

In Tamil Nadu, food items such as rice, sugar, urad dhal, toor dhal, palm oil, raw rice, etc., are supplied through fair price shops at administered price by Public Distribution System. Since there is ease in availability and accessibility, consumption of these food items are high among the farmers and study reveals that farmers are using public distribution system on regular basis to meet their basic needs and survival.

Cereals provide basic fuel for our body and form a major part in our nation's diet. (Gopalan et al. 2009)

#### **Pulses and Legumes:**

With regard to pulses and legumes, majority ninety-four percent of the farmers are consuming urad dhal on daily basis, Bengal gram dhal and toor dhal on weekly basis, majority of the farmers are consuming green gram dhal and cow pea sundal on monthly basis,

The reason behind the regular consumption of urad dhal is due to most of the breakfast and dinner preparations such as dosa, idly, and utthappam is made out of urad dhal. Idly and dosa being the most consumed dishes daily in majority of the household of rural parts of tamilnadu. Toor dhal plays an important role in south Indian cuisine and one of the key ingredients in preparation of sambar, a famous dish made in every household of the rural area at least twice or thrice in a week.

Pulses are the protein rich food and known for its vital contribution in agriculture and also promote sustainable eating. (Shalendra K.C et, al., 2013)

#### **Meat & Meat Products:**

Subject to flesh foods, eighty-eight percent of the famers are consuming chicken on weekly basis, and mutton (lamb meat) on monthly basis and liver on rarely basis; beef and pork meat are not included in the farmer's dietary pattern since they follow strong religious restrictions in their dietary pattern.

**Milk and Milk Products:**

Ninety-three percent of the farmers are consuming milk on daily basis, and only five percent of the farmers are not consuming milk in any forms. Nonetheless their quantity of consumption of milk was very less, because they are consuming milk only in the form of coffee and Tea. Hence figure 1 state that almost half of the farmers (49%) reported with knee & joint pain may be due to inadequate milk consumption and calcium deficiency. With regard to fermented milk products, forty-three percent of the farmers consuming curd and butter milk only on weekly basis. Other milk products such as buffalo's milk, butter, cheese and skimmed milk powder are not preferred by farmers in their dietary pattern. Especially cheese consumption among farmers was remarkably very less.

Calcium and Vitamin D play a significant role in bone growth and development. Lack of calcium may lead to cramps, joint pains, heart palpitations, increased cholesterol levels, slow pulse rates, insomnia, impaired growth, excessive irritability or nerves, muscle cramps, brittle nails, eczema, and numbness of the arms and or legs. (Piste Pravina, et al., 2013)

Fermented food products contain live micro organisms. Adding probiotics in the diet regularly helps to promote gut health, boost the immunity and enhances digestion in the body (Haque and Chand, 2006).

**Vegetables and Green Leafy Vegetables**

This study reveals that farmers eat seasonal, locally grown vegetables, green leafy vegetables and fruits which are cultivated by them and grown in their habitat. Therefore farmers follow sustainable eating practices. One of the most well liked food items is palm sprout (panam kizhangu), it is widely grown and consumed abundantly in all their households.

**Fried and Processed Foods**

Fast foods, fried foods and Processed foods consumption assumed to be the main cause for hypertension and diabetes. Consumption of Pickles, vadams/vathal is high, because they are served as the accompaniment for all the food items especially for porridge and rice dishes in rural area.

The higher content of Tran's fatty acids in processed, fried and fast foods had association of this fatty acid leading to cardiovascular disease (Singh RB et al., 1996). The main risk of eating pickles leads to consumption of indirect sodium which leads to hypertension. In case of commercial pickles they prepare by using different chemicals as a preservative agent and artificial colors to increase the acceptability

of the food product which are harmful to health. If there is too much oil content, it can increase cholesterol in the blood. (hina firdous, 2020)

**Fats and Oil:**

Palm oil is the main source of oil which was used in their cooking beside sunflower oil. The reasons they discussed was palm oil and sunflower oil are comparatively cheaper than the other kinds of oil.

Similar results of dietary pattern observed at study in rural community. (Babitha Aila, et al., 2020)

**Sugars:**

The consumption pattern of sugar among farmers shows that ninety-eight percent of the farmers are consuming sugar on daily basis. Farmers disclosed that some years back, they used to consume only Palm jaggery, Palm sugar and brown sugar in their daily diet for preparation of coffee, tea and sweets. Since the cost of living is high in these days and products are expensive, consequently they shifted to white sugar, which is cheaper and also distributed in fair price shops at reasonable cost.

**IV. NUTRITION EDUCATION PROGRAM (NEP):**

The NEP was conducted during the month of October 2020 to April 2021 in two selected villages of Ramanathapuram district. The location was selected on the basis of infrastructure, facilities and easily accessible to farmers to attend the NEP session. The NEP session was planned and conducted in a community hall in kokkarasankottai, and government primary school tharakudi. Prior to this session, farmers were advised to wear mask, and maintain social distance of 06 feet mandatorily. Sanitizers were provided at the entrance of the community hall and primary school. Demonstration of wearing mask, sanitizing hands using sanitizer, and practicing social distancing has been educated to the farmers.

This study is an experimental research in which pre-test and post-test were conducted.. Subject to pre-test design; prior to beginning of NEP, the data has been collected from the farmers using a structured questionnaire comprised of importance of wearing mask, hand hygiene and practicing social distancing. After data collection, Nutrition Education Program was conducted. The NEP is divided into two sessions; morning and afternoon session. During morning session, wearing mask, precautions to be followed while disposal of masks, instructions for washing reusable fabric mask, do's and don'ts while wearing mask has been instructed to farmers and importance of social distancing has been educated. Followed by hand sanitization; live demonstration of sanitizing the hands using sanitizer and soap, importance of hand

sanitization, obviating of high-touch points such as door knobs and staircase rods while visiting high-crowded places like markets, hospitals, or travelling in public transportation were educated during the NEP morning session. During afternoon session of NEP, significance on consumption of immunity boosting foods in their daily diet has been discussed.

With regard to immune boosting foods, importance of vitamin-c rich dietary sources such as citrus fruits, guava and green leafy vegetables has been highlighted in the dietary session considering the fact that it is seasonally grown, easily accessible and affordable by farmers. Citrus fruit is one of the nature's best and easily available sources of vitamin C such as oranges, lemons and limes, a key nutrient in supporting immune system and also contains fiber. Citrus fruits are known to have other benefits such as antioxidant, cardio protective and neuroprotective effects. (Lv et al., 2015).

To emphasize millet consumption and their nutritional benefits, Foxtail millet (Thinai) was chosen for live demonstration of millet recipes. Foxtail millet was chosen for dietary session due to its unrestricted availability in the rural area. As majority of the farmers had a good knowledge on the millets, wide range of recipes/dishes using foxtail millet and their health benefits are discussed. The recipes prepared using foxtail millet such as Dosa, Pongal, adai, curd rice, paniyaram has been discussed in Nutrition Education Program. At the end of the session, post-test data comprised of KAP in Covid 19 and dietary pattern has been collected from the farmers using a structured questionnaire. The questionnaire has been translated from English to regional (Tamil) language by the semi trained interviewer.

Effect of nutrition education program was coded and statistically analyzed in SPSS software. The data reveals that there is a significant difference ( $p < 0.05$ ) after the nutrition education program.

## V. LIVE DEMONSTRATIONS

### A. Kabasura Kudineer:

The demonstration commenced with introducing the ingredients and a brief explanation about the kabasura kudineer. A guideline to be followed during the preparation, dosage of consumption, life span/shelf life of kabasura kudineer as per AYUSH recommendation has been addressed in the demonstration session.

### B. Foxtailmillet Pongal:

The live demonstration starts with constituent such as introducing the foxtail millet, cooking equipment (e.g., heavy bottom vessels) to be used while cooking

millets, washing and soaking of millets prior to cooking, cooking process are instructed. The prepared foxtail millet sweet pongal was served to the farmers for tasting. Health benefits of foxtail millet comprises of functioning of nervous system, bone health, muscle health, cardiac health, regulation of blood sugar level, lowering blood cholesterol, immunity boosting has been discussed during this demonstration.

Beta-carotene is a powerful antioxidant that can reduce inflammation and boost immune function by increasing leucocytes in the body. Excellent sources of beta-carotene include sweet potatoes, carrots, and green leafy vegetables (Grune et al., 2010).

## CONCLUSION:

The results revealed that as percentage of age increases, percentage of farmer's frequency also increases. They follow sustainable eating pattern simultaneously fried foods, processed foods consumption also high among them which lead to excess intake of certain nutrients such as sodium and carbohydrates. These factors influence non communicable diseases among them. Even though they are the producers of millets and vegetables, consumption of those is very less among them, due to the diverse factors such as socio economical issues and to fulfill their basic necessities, produced crops are traded for profit. Hence nutritional care was given to confer insight to the right dietary pattern through nutrition intervention activities among farmers during Covid 19.

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