EVALUATIVE STUDY ON CONSUMER ACCEPTANCE AND SATISFACTION REGARDINGTHE MILLET BISCUITS AMONG CHILDREN IN SOCIAL WELFARE SCHOOLS (TSWREIS)

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B.Sc. (Hons) Home Science

MASTER OF SCIENCE IN HOME SCIENCE

(RESOURCE MANAGEMENT AND CONSUMER SCIENCES)

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By

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B.Sc. (Home Science)

THESIS SUBMITTED TO THE PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE

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DECLARATION

I, **NOMULA PRATHYUSHA,** hereby declare that the thesis entitled **"EVALUATIVE STUDY ON CONSUMER ACCEPTANCE AND SATISFACTION REGARDING THE MILLET BISCUITS AMONG CHILDREN IN SOCIAL WELFARE SCHOOLS (TSWREIS) "** submitted to the **Professor Jayashankar Telangana State Agricultural University** for the degree of **Master of Science in Home Science** is the result of original research work done by me. I also declare that no material contained in the thesis has been published earlier in any manner.

Place: Hyderabad **(NOMULA PRATHYUSHA)**

Date: **ID. No. HHM/ 2019-13**

CERTIFICATE

Ms. NOMULA PRATHYUSHA has satisfactorily executed the course of research and that thesis entitled **"EVALUATIVE STUDY ON CONSUMER ACCEPTANCE AND SATISFACTION REGARDING THE MILLET BISCUITS AMONG CHILDREN IN SOCIAL WELFARE SCHOOLS (TSWREIS)"** submitted is the result of original research work and is of sufficiently high standard to warrant its presentation to the examination. I also certify that neither the thesis nor its part thereof has been previously submitted by her for a degree of any university.

Place: Hyderabad **Dr. V. VIJAYA LAKSHMI**

Date: **Chairperson**

CERTIFICATE

This is to certify that the thesis entitled **"EVALUATIVE STUDY ON CONSUMER ACCEPTANCE AND SATISFACTION REGARDING THE MILLET BISCUITS AMONG CHILDREN IN SOCIAL WELFARE SCHOOLS (TSWREIS)"** submitted in partial fulfilment of the requirements for the degree of **'Master of Science in Home Science'** of the **Professor Jayashankar Telangana State Agricultural University, Hyderabad** is a record of the bonafide original research work carried out by **Ms. NOMULA PRATHYUSHA** under our guidance and supervision.

No part of the thesis has been submitted by the student for any other degree or diploma. The published part and all assistance received during the course of the investigations have been duly acknowledged by the author of the thesis.

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Date: **NOMULA PRATHYUSHA**

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LIST OF SYMBOLS AND ABBREVIATIONS

%	:	Percentage
(s)	:	Students
<	:	Less than sign
>	:	Greater than sign
et al.	:	And other people
etc.	:	And so on; and other people/things
i.e.	:	that is
RTC	:	Ready to cook
RTE	:	Ready to eat
SAS	:	Statistical analysis system
SD	:	Standard deviation
ICMR	:	Indian Council of Medical Research
TSWREIS	:	Telangana Social Welfare Residential Institutions Society
FMF	:	Finger Millet Flour
MB/Day	:	Millet biscuits per day

LIST OF APPENDIX

Author	**:**	**NOMULA PRATHYUSHA**
ID No.	**:**	**HHM/2019-13**
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ABSTRACT

Millets are gaining popularity among the consumers. They are considered as nutritious and treasure house of many health benefits. Government of India proposed budget to these millets as nutria-cereals and encouraging millet production. Millet food entrepreneurs are also trying to promote and commercialize different millet based products, thereby increasing the consumption of millets and ensuring nutritional security of the consumers. PJTSAU has taken up a unique initiative role to promote millets among different consumer groups by manufacturing different kinds of food products. With specific reference to the growing children, PJTSAU included few millet products like biscuits in the diet chart of 400 social welfare schools in Telangana. Therefore, an “Evaluative study on Consumer Acceptance and Satisfaction regarding

the Millet biscuits among children in social welfare schools (TSWREIS)" was taken up with the following objectives:

- To study the consumer awareness among school children regarding benefits of millet biscuits.
- To analyze the consumer acceptance of millet biscuits, manufactured and supplied by "PJTSAU" in the study area.
- To assess the taste preferences between girls and boys regarding millet biscuits.
- To study the consumer level of satisfaction of millet biscuits.

Exploratory research design was adopted to conduct the study. Multistage sampling technique was adopted for the study. The list of schools that were supplied millet biscuits as snacks for students in Hyderabad and Nagarkurnool districts was collected through Millet Processing and Incubation Centre (PJTSAU). Among two districts from the list, four schools were selected from urban and rural regions. A total of one hundred and twenty students i.e. from Shaikpet -30, Mahendrahills -30, Achampet -30 and Mannanur -30 were selected in Hyderabad and Nagarkurnool districts to study the consumer acceptance and satisfaction of millet biscuits in TSWREIS. The data was collected from the respondents by using the structured interview schedule. Statistical procedures like frequency, percentage and correlation tests were conducted to analyze and interpret the collected data.

The results revealed that equal proportion of the respondents (50%) belonged to 12-15 years and 16-19 years. Equal percentage (50%) of the respondents belonged to secondary school education and junior college. Out of the total respondents, each fifty per cent were male and female respondents. More than half of the respondents (56.70%) belonged to nuclear families followed by 43.40 per cent of the respondents belonged to joint families. Cent percent of them were aware of millet biscuits followed by roti (90.8%), flour (87.5%), laddu (86.6%), muruku (73.3%), rawa (19.16%), rusk (16.6%), cookies (15%), flakes and ragi bites (11.6%), muffins (10.8%), vermicelli (7.5%), millet smoothix (4.16%) while negligible proportion knew about cakes (3.33%).

Maximum respondents (91.6%) got information about millet biscuits from school/hostel. More than half (60%) of the respondents consumed millet biscuits for 1

to 3 years. On the whole, 80.8 per cent of the respondents were consuming millet biscuits weekly once. Among all the respondents 85.8 per cent of the respondents were consuming less than five biscuits per day. Majority of the respondents (89.16%) were not aware, 83.3 per cent were facing non availability problems.

About 89 per cent perceived that millets were good for diabetes, as they had high fiber content (85.8%), rich in minerals and vitamins (84.1%), had high protein content (35.83%), it lowers high blood pressure (15%) and gluten free and non allergic (5.8%).Maximum respondents (91.6%) were aware through school/hostel, 57.5 per cent from family, 15 per cent through neighbours / friends, 11.6 per cent from exhibitions and only 8 per cent through publicity in T.V and Newspaper. Good taste was ranked as important reason (1^{st} rank) for acceptance. The most significant factor for consuming millet biscuits were influenced of neighbours and friends (2^{nd} rank) and health benefits (3^{rd} rank). Level of acceptance regarding millet biscuits revealed that 62.5 per cent of the respondents expressed average followed by 25 per cent with high acceptance and very few (12.5%) felt low level of acceptance.

Taste factor was ranked high (1st rank) in giving satisfaction to the user followed by nutritious factor (2^{nd} rank), appearance (3^{rd} rank), texture (4^{th} rank) and least acceptable factor was smell (5^{th} rank). About 95 per cent expressed high satisfaction with the taste. Regarding the packaging factor, mostly (82.5%) quoted as average to some extent (15.83%) as good packaging and the tiny proportion (1.66%) expressed as poor packaging. The leading reason for satisfaction was that the products were tasty followed by the factor “easy to digest” (2^{nd} rank) and only few consumers were aware of millet benefits (3^{rd} rank). Majority (90%) of the girls expressed their preference was liked very much and about eighty six per cent of the boys chosen liked very much towards the taste of millet biscuits.

Correlation analysis showed that there was no significant relationship between age, education, gender and satisfaction level. There was a significant relationship between age, education and acceptance level. There was no significant relationship between gender and acceptance level.

Chapter I

INTRODUCTION

Consumer demand for food is a significant factor in the formulation of various new processing techniques. The nutritional content of foods mainly concerns about the nutrition and health issues faced by people. In India consumption of foods that offer health benefits is high. Daily diet requires various food groups, among them millets play a key role in maintain the health. Millets are the staple foods gaining high popularity among the consumers and are well known as highly nutritious and treasure house of various health benefits. They are adaptable to many soils, climatic conditions with very low inputs such as fertilizers and pesticides and require less water. They are group of small grained cereal food crops which are non-acid forming, non-glutinous and also easy to digest (Nazni and Bhuvaneswari, 2015). Millets are the best alternative crops to combat the malnutrition with the increasing population (Upadhyaya *et al.,* 2016).

Millets grow in areas with low fertility, low rainfall and also minimum irrigational facilities. They are hardy plants capable of growing in areas where most of the cereals fails. Millets have many useful health promoting properties and have good potential to add variety to the diet. Sorghum has various antioxidant and phenolic compounds that have great health benefits making the grains suitable for developing functional foods (Kulamarva *et al*.,2004).

Millets play a vital role in human diets to decrease the nutritional imbalances. Sorghum is one such millet that contains high levels of iron and zinc, hence being targeted as a means to reduce micronutrient malnutrition globally (icrisat.org). Preference towards millet consumption is increasing due to increased awareness on the nutritional benefits of millets and also to avoid diseases, mainly cardiovascular diseases, obesity, diabetes mellitus and cancer. Socio - demographic factors such as education, urbanization, income and cultural preferences affect the consumption of millets (Basavaraj *et al.*2010).

Millets are best protenicious food that contains an average of 10 - 12% protein. They are superior to protein content of wheat or corn in terms of essential amino acids

and contain less content of lysine that is found in very high quality protein sources such as meat, egg. In making flat cakes, cookies and breads uses mainly Millet flour. Millet lacks gluten, the wheat protein that makes dough prepared from wheat flour elasticity.

In the world millet production was estimated at 27.8million tons. India is the largest producer with 41.04% global market share. Food and nutritional security are the major challenges in developing countries like India and Africa, where Millets are highly popular. During 2019-2024, worldwide millet consumption has declined at a rate of 0.9% and India dominates global production while Africa dominates global consumption. In India, currently the Millet production is more than 50%. (Global research and markets, July 22, 2019). In India to encourage the millet production, Government proposed budget to the millets as nutria-cereals. To ensure nutritional security of the consumers and also to commercialize various millet-based products, the food entrepreneurs are trying hard to increase the consumption of Millets (Sulthana, 2014).

In China, India and other Asian countries Foxtail millet (*Setaria italica*) is generally grown as a rain-fed crop in India, besides China and Bangladesh. It is also called as tenai, kakun, kangni and navane. It is the major crop cultivating for food as well as feed and used as part of ayurvedic and unani products by the practitioners. It is non-glutinous, and non-acidic food, possesses the larger amount of proteins and minerals acts as a functional food ingredient and good supplementary protein source to most cereals, due to its high lysine, fibre content mostly known as easily digestible food (Sharma *et al*., 2015).

Millet production is popular in developing regions like India and Africa. It is essential to revert to traditional Telangana diet of millets to alleviate nutrition problems. The Professor Jayashanker Telangana State Agricultural University (PJTSAU) found that the result based on a study of "*Food consumption pattern in Telangana state*" as millet consumption is low at 0.03 per cent and 0.06 per cent of the total cereal consumption in urban and rural areas of Telangana respectively. According to the NIN, balanced diet is one that provides 40-60 per cent energy from Millets and rest from other cereals. (*THE NEW INDIAN EXPRESS,* 2019*).* In order to address malnutrition issues with specific reference to the growing children, in Telangana - PJTSAU included

few millet products like biscuits, cookies and vermicelli in the diet chart of nearly 400 social welfare schools. PJTSAU took initiative to promote and build awareness about millets and its nutritional benefits among consumers by manufacturing different verities of food products by supplying snacks to TSWREIS. (*The Hindu, 2017*).

Low awareness and habit of inculcating millets in our daily diet was less which might be a reason for low consumption of millets. Consumption of millets must be inculcated during childhood to avoid many health-related issues. The focus of the festival is to sensitize urban and rural communities to the benefits of incorporating millets into their daily diet and create market linkages for farmers producing these crops. The Millet Fest- 2013, 2014 and 2015 were organized by the Department of Agriculture, Government of Telangana, College of Home Science in collaboration with Prof. Jayashankar Telangana State Agricultural University (PJTSAU).

Awareness campaigns are being conducted regularly by the College of Home Science, Prof. Jayashankar Telangana State Agricultural University, Hyderabad, the rural and urban communities on the virtues of including millets in daily diet and ways to develop markets for millet farmers. The College of Home Science regularly performs research to create millet-based processing technologies for snack and meal items to promote consumption among rural women. Mostly in rural areas women were not aware of their health issues caused during menstruation period and pregnancy phase. Pregnancy and lactating women are well advised to consume millets to increase the production of breast milk. It leads to a healthy life for both mother and child. It is necessary to disseminate the lessons learned on millets to wider national and international audiences. This study helps us to know about the importance and consumer awareness about millets and its need for the present human to lead a healthy life.

Millets are minor cereals containing high nutritional value but its consumption is limited due to the lack of ready-to-eat or ready-to-cook foods. To improve its nutritional and economic value, processing of millets is best alternative to prepare RTC foods. In the world among most important cereals ranging from wheat, maize, rice and barley, Millet possess fifth place. Millet grains are used for traditional and novel foods as they are highly palatable and good for health (Devi and Sangeetha, 2013).

Epidemiological studies had revealed that consumption of proso millet reduces risk of chronic diseases, such as elevated serum cholesterol, type II diabetes, cardiovascular disease and liver injury (Zhang *et al*., 2014). Advancement in science and food technology has drawn the new way to improve the food industry as Ready-To-Cook (RTC) foods or partially cooked foods can be utilized in a comfortable and convenient form within a short period and also considered as one of the best alternative home-based meal (Takhellambam *et al.*, 2015)

The millets not only provide farmers with a market share but also save foreign exchange like importing cereals and exporting millets. In developed countries, like China for consumers with different celiac disease and other intolerances, there is a great demand for gluten-free foods and beverages. As millet consumption extends beyond breakfast at any time of the day, the millet products have become an excellent vehicle for delivering ingredients to functional foods on the market. Millets have an increasingly important role in modern lifestyle due to the convenient forms they can use such as ready-to-eat food products.

Consumer preferences are essential, need to be understood well in order to give better food products and also important for Researchers, Entrepreneurs to encourage their new products and satisfy the consumers (Srinivasulu, 2011). Hence, the study is proposed to examine the consumption pattern of millets by the students. There is a need to include higher protein containing foods such as pulses in schools to reach the nutritionally balanced diet (Shirisha, 2018). Thus, the present research topic "**EVALUATIVE STUDY ON CONSUMER ACCEPTANCE AND SATISFACTION REGARDING THE MILLET BISCUITS AMONG CHILDREN IN SOCIAL WELFARE SCHOOLS (TSWREIS)**" has proposed with the following objectives:

Objectives

1. To study the consumer awareness among school children regarding – benefits of millet biscuits.
2. To analyze the consumer acceptance of millet biscuits, manufactured and supplied by "PJTSAU" in the study area.

3. To assess the taste preferences between girls and boys regarding millet biscuits.
4. To study the consumer level of satisfaction of millet biscuits.

Hypothesis

$H_1$1: There is a significant relationship between education and consumer acceptance of Millet Biscuits.

$H_1$2: There is a significant relationship between gender and taste preferences regarding Millet Biscuits.

Limitations of the study

- Area of the study was restricted to Hyderabad and Nagakurnool districts with a fixed sample size 120 TSWREIS students.
- The study was conducted only in Social-welfare schools.

Operational Definitions

Consumer satisfaction

Customer satisfaction is defined as the number of customers, or percentage of the total customers, whose reported experience with a firm, its products, or its services (ratings) exceeds specified satisfaction goals.
(https://en.wikipedia.org/wiki/customer_satisfaction)

Consumer acceptance

Customer acceptance means the acceptance by a customer of a product unit which has been sold. The extent to which a consumer will use a certain innovation. (https://www.lawinsider.com/dictionary/customer-acceptance)

Factor

Factors are the variables that experimenter's control during an experiment in order to determine their effect on the response variable. A factor can take on only a small number of values, which are known as factor levels. Factors can be a categorical variable or based on a continuous variable but only use a limited number of values chosen by the experimenters.
(https://statisticsbyjim.com/glossary/factors/)

Chapter II

REVIEW OF LITERATURE

In the modern lifestyle, millets are superior to major cereals with respect to its nutritional benefits and nutrient composition. Though minor millets are nutritionally superior to cereals but utilization is very limited owing to drudgery associated with different processing methods (Yenagi *et al.* 2013).

A comprehensive and brief review of literature is important for any research endeavour. The crucial purpose of collecting the review of literature is to gain an insight in to the different researches conducted in the past in relation to the research topic and to identify appropriate research design, methods of measuring concepts, analysis techniques and also to discuss the data collected. Thus, the present study entitled "Evaluative study on consumer acceptance and satisfaction regarding the millet biscuits among children in social welfare schools (TSWREIS)" was conducted among school children. In this chapter, relevant literature pertaining to the study having direct/indirect bearing on the current research has been reviewed and brief account is presented under the following headings:

2.1 Theoretical perspectives

2.1.1 Introduction to millets and types of millets

2.1.2 Importance of millets and different millet products

2.1.3 Nutritional composition and health benefits millets

2.2 Research studies

2.2.1 Awareness of consumers about millet products

2.2.2 Consumption pattern of millets among adolescents

2.2.3 Consumer acceptance and satisfaction about millets

2.1 Theoretical perspectives

2.1.1 Introduction to millets and types of millets

Millet is the French word derived from "mille" i.e. handful of millet contains thousands of grains (Taylor and Emmambux, 2018). This crop is mostly used for a dual purpose as food for consumption and also fodder for livestock.

Millets are small seeded hardy crops and cultivated in low fertile land, rain-fed and mountainous areas. Millets are group of small grained cereal food crops which are highly nutritious and are grown under low fertile soils, less water requirement, adaptable to many soils, climatic conditions with very low inputs such as fertilizers and pesticides. With the increasing population millets are the best alternative crops to combat the malnutrition (Upadhyaya *et al.*, 2016).

According to Michaelraj and Shanmugam (2013) millets are the first cereal grain to be used for domestic purposes and are very old foods known to humans. Adekunle (2012) had reported that millets are the major food sources for millions of people, especially those who survive in hot and dry areas of the world.

Commercial production of biscuits and confections, beverages, weaning foods, and beer uses mostly sorghum as raw material. Cookies and soft biscuits are being made using combinations of sorghum, maize, and wheat. Progress in the infant weaning foods sector was limited by production capabilities. Millets not only provide nutritious grain but also fodder and they grow very well in dry land farming due to their short growing season. Though all the millet varieties belong to the Poaceae family, they differ in appearance, colour and species. The Millet crop is divided into two categories as major and minor millets. Major millets include pearl millet (bajra), sorghum (jowar), finger millet (ragi) and minor millets include foxtail millet (kakum), proso millet (Chena), little millet (kutki), kodo millet (kodon), barnyard millet (sanwa), and brown top millet (Gopalan *et al*.1980).

Sorghum **Pearl Millet** **Finger Millet**

Figure 2.1 Major Millets

Kodo Millet

Barnyard Millet

Little Millet

Brown top Millet

Foxtail Millet

Proso Millet

Figure 2.2 Minor Millets

These millets are being processed and made into ready to eat products. Smart food was taken forward, many organisations have already teamed up to popularise the millets. In India, this includes Indian Institute of Millet Research (IIMR) and National Institute of Nutrition (NIN).

2.1.2 Importance of millets and different millet products

India needs to work on the millets revolution in order to ensure a nutritious diet and good health. To boost production of the nutrient-rich millets and the agro-industries involved in its production, the Government of India has approved 2018 as the National year of millets. In the country, observation of that year of millet helps in the promotion of millet production and consumption. India is endowed with the hundreds of nutritious crops. Production of millets has numerous securities, such as security of food, nutrition, fodder, fiber, health, and livelihood. Millets are storehouse of dozens of nutrition in large quantity and long term consumption of millets may bring several health benefits of the people, hence they can help to resist malnutrition.

Fatma *et al*. (2016) aimed to study about the healthy gluten free biscuits and cake from germinated millet flour (GMF) and rice flour (RF). Cent percent rice flour was given to control sample and substituted by 25, 50, 75 and 100% germinated millet flour. The results elucidated that the substitution of germinated millet flour (GMF) increased fat, protein, Zn, Fe, Ca phenolic and flavonoid contents in the produced biscuits and cake and decreased their antinutritional factors.

In a weaning process there is always the need to introduce soft, easily swallowed foods to supplement the infant's feeding early in life. A process weaning diet from pearl millet conophornut flour was found to promote growth in a clinical experiment (Akeredolu et al., 2005).

2.1.3 Nutritional composition and health benefits of millets

Millets contain important health benefiting factors namely reduces the risk of heart diseases and diabetes, improves the digestive system, helps in respiratory health, helps in fighting cancer etc (Manach *et al*., 2005). The nutrients present in millets i.e. resistant starch, lipids, oligosaccharides, antioxidants such as phenolic acids, flavonoids, lignans and phytosterols are responsible for number of health benefits (Edge *et al*., 2005).

Millets	Protein	Fiber	Fat	Minerals
Foxtail millet	12.3	8.0	4.3	3.3
Little millet	7.7	7.6	4.7	1.5
Proso millet	12.5	2.2	1.1	1.9
Barnyard millet	6.2	9.8	2.2	4.4
Kodo millet	8.3	9.0	1.4	2.6
Finger millet	7.3	3.6	1.3	2.7
Sorghum	10.4	2.0	3.1	1.6

Figure 2.3 Nutritional composition of millets

In comparison to major cereals such as wheat and rice, millets are the key source of energy, protein, and contain high nutritive value (Habiyaremye *et al*., 2017; Amadou *et al*., 2013). Due to the presence of high calcium, iron, potassium, magnesium, phosphorous, zinc, dietary fiber, polyphones, and protein content millets

are most unique among the cereals (Habiyaremye *et al*., 2017; Gupta *et al*., 2014). Millets are gluten-free, ideal for gluten-intolerant people, though millet flour cannot be used for raised bread (Amadou *et al*., 2013; Santra, 2015). Millets have relatively poor digestibility and low bio-availability of minerals (Nehir and Simsek, 2012). The health benefits have been partly attributed to a wide variety due to the presence of antioxidants in foods such as millets (Izadi *et al*., 2012).

Millets are easy to digest as they contain a high amount of lecithin, which provides excellent support for nervous system (Pathak, 2013). They generally contain significant amounts of essential amino acids, particularly those containing sulphur and also have higher fat content than maize, rice, and sorghum (Habiyaremye *et al*., 2017). Mostly millets offer many nutritional health benefits in daily diet and also helps in the management of disorders like obesity, diabetes mellitus, etc. (Veena, 2003).

Finger millet is also a good source of essential amino acids like arginine, lysine etc and performs a number of essential health promoting functions (Glew *et al*., 2008). Sorghum was significantly used to manage cholesterol levels in humans (Carr *et al*., 2005). Pearl millet is high in iron, zinc and folic acid which is not only among the highest micronutrient needs but also particularly important for adolescent girls and women. Finger millet has three times the amount of calcium as milk and also important for women and babies. Millets are also high in antioxidants and important for fighting diabetes and heart disease which are at significantly increasing levels in India.

The carbohydrate content of barnyard millet is low and slowly digestible, which makes the barnyard millet a nature's gift for the modern mankind who was engaged in sedentary activities (Deepthi, 2015). Kodo millet is very easy to digest; it contains a high amount of lecithin and is excellent for strengthening the nervous system (Itagi, 2003).

Finger millet helps in losing weight, ragi is having an amino acid called Tryptophan which helps in lowering of appetite and helps in weight control. It gives fullness feeling thus controlling the excessive food consumption. The collagen incubated with finger millet and kodo millet extracts inhibited glycation. The study implicates the potential usefulness of the above millets in protection against glycation and cross linking of collagen (Hegde *et al*., 2002).

Rani *et al.* (2017) focused on the pearl millet processing methods and enrichment of nutritional value products - longer shelf life with reduced anti nutritional content.

Weaning food blends prepared from fermented pearl millet/roasted cowpea in 70:30 and 60:40 ratios were reported to have resulted in lower levels of phytic acid and higher in vitro protein digestibility of the weaning food blends (Laminu et al., 2011).

Shobana *et al*. (2009) showed that phenolic extracts from finger millet seed coat were responsible for inhibiting enzymes such as α-glucosidase and pancreatic amylase, thus indicating their therapeutic potential for managing postprandial hyperglycemia.

2.2 Research studies

2.2.1 Awareness of consumers about millet products

Awareness and consumption remain one of the most important factors in this revival. The queries tend to increase in regions where millets are not part of the staple diet or their consumption has been minimized over the years**.** In Southern Karnataka, 100 percent of the rural population and 94 percent of the urban population consumes finger millet as a traditional food called mudde or thick porridge (Sehgal and Kawatra, 2002).

Food entrepreneurs were trying to promote and commercialize different millet-based products, thereby increasing the consumption of millets and ensuring nutritional security (Sulthana, 2014). There was a need to restore the lost interest in millets that deserves recognition for its nutritional qualities and potential health benefits in management of diabetes mellitus, obesity and hyperlipidemia (Patil *et al.,* 2014; Ugare *et al.,* 2014).

Consumers have the tendency to attract for easily prepared foods mostly snacks, they are alternatives to quick meals with or without substantial nutritional value. Various products like cakes, popcorn, mini-pizzas and cereal-based bars etc. can be classified as snacks (Bower and Whitten, 2000). Provision of high nutritionally superior grains would improve the utilization for better nutrition and thus, encourages the farming and processing sectors to the modern consumers (Takhellambam *et al*., 2015).

Processing of millet to make it for ready-to-eat products mostly enhance its food

and economic value (Ushakumari *et al.* 2004). Mostly soft biscuits and cookies were being made using millets. The uses of millets as an industrial raw material include production of biscuits and confectionery, beverages, weaning foods and beer (Laminu et al., 2011; Anukam and Reid, 2009). Sorghum, maize and wheat composites, while cakes and non-wheat breads have become a subject of increasing scientific and technological enquiry, showed that improved awareness among consumers (Akeredolu et al., 2005; Laminu et al., 2011).

Alekhya and Shravanthi (2019) explored on consumer buying behaviour towards food products made from millets. Findings of the study revealed that income and consumption of millet was not correlated. Consumers were aware through magazines and television (2%), newspapers (7%), peer group (35%), and social media (55%). Most influencing factors for buying millet-based foods were health benefits (57%), taste (26%), to lose weight (13%) and 4% - preferred by habituation.

Kalaiselvi *et al.* (2016) had explored on the awareness and consumption of millets by woman in Coimbatore city. Rank was given for consumption and awareness as 1 - nutritional value, 2 - consumption pattern, 3 - best food for diabetics, 4 - price, 5 - convenience factor, 6 – taste, 7 - weight reduction. It concludes that the awareness of millets was associated with age and education of the respondents.

According to Samuel (2016) minor millets such as foxtail millet, little millet, kodo millet, proso millet and barnyard millet as well as the major millets such as sorghum (great millet), bajra (pearl millet) and ragi (finger millet) are increasingly being included in the food basket of rural and urban households.

Dukpa and Doma (2012) worked on a case study of semi arid mountain communities in Nepal. Examining that small millet based food and livelihood security. Results revealed that small millets mostly ensure food security, provides livelihood opportunities.

Millets are not only the powerhouses of nutrients; they also play the role of hedging against several insecurities (food, fodder, fibre, health etc). However, the cultivation of millets has declined in recent years, which has to be revived due to its nutritional benefits and it is essential to encourage the consumers to include millet in their regular diet to fight malnutrition.

2.2.2 Consumption pattern of millets among adolescents

Millet is a minor cereal possessing high nutritional value, highly palatable and the grains were used for traditional and for novel foods but its consumption level is limited mainly due to lack of cooking knowledge regarding millet products.

Millet is a whole grain with protein, antioxidants and nutrients. The consumption of millets as a whole grain offers the nutritional and health benefits. Millets are considered the least important of cereals with annual production less than 2% of the world's grain. Millets are of great local importance as staples and as reserve crops in marginal areas. Processing of millets affect the antioxidant content and nutrition activity (Saleh *et al*., 2013).

Innovative cooking recipes from minor millets have great protein and minerals rich supplementary foods to alleviate Protein Calories Malnutrition (PCM) and mineral deficiency diseases prevalent among school going children (Rajput, 2019).

Interest towards millet consumption is expanding due to increased awareness on the nutritional quality of millets and also to manage life style related diseases, especially diabetes mellitus, cardiovascular diseases, obesity and cancer. There is a need to include higher protein containing foods such as pulses in schools to reach the nutritionally balanced diet (Shirisha, S 2018).

Barratry and Rajapushpam (2018) carried out a research in Salem district regarding perception level of millet products which revealed that finger millet foods were highly consumed by the households.

Umanth *et al*. (2018) worked on the millet consumption probability and demand in India. The study concludes that the sorghum comprised the larger proportion of consumption. Millet consumption was decreased by 50 percent in rural and 35 percent in urban.

Shirisha (2018) studied the pattern of consumption regarding millets and millet based products. Results of the study showed that 70% were consuming millets, 30% were not consuming and 92 percent were aware of millets.

Although minor millets are nutritionally superior to cereals, their utilization and consumption was limited owing to drudgery associated with its processing.

Advancement in science and technology has paved the way in upsurge of food industry. Foods which are partially cooked that can be utilized in a very easy and convenient form within a short duration are known as Ready-To-Cook (RTC) foods (Takhellambam *et al.*, 2015).

Lalita. S (2014) had worked on consumer perception and its marketsegmentation of millet products. The study confirms that 90 percent consumers felt prices of products was reasonable. Among all the consumers 71.67 percent were well educated respondents. Different product attributes namely taste, texture, colors were moderately liked and the most influencing factor to consume millets was healthy and nutritious.

Usually, postmenopausal women suffer from signs of cardiovascular disease, like high cholesterol levels, high blood pressure. Hence, consumption of kodo millet in their daily diet is extremely beneficial to maintain good health (Shahidi and Chandrasekara, 2013).

Abdullah (2013) revealed that the determinants for local pearl millet consumption was education level of household, age, price and food preferences. From the farmers to consumers marketing was the most preferred channel for marketing.

Dayakar Rao et al, (2013) states that millet contains gluten free properties thus regular consumption is beneficial for patients suffering with celiac disease. Due to more fiber content it slows down the food movement from stomach to the intestine. Pearl millet aids in weight loss. Hence, consumption of millets makes longer duration of food intervals and thus millets have great role in helping to fight against obesity.

Saleh *et al.* (2013) worked on millet grain nutritional quality, processing and potential health benefits. Processed and evaluated nutritional quality to enhance bioavailability of micronutrients. Findings of the study resulted that consumption of millet leads to many health promoting components.

Ong-udi (2013) analysed the performance and efficiency of pearl millet in Kenya. Results shown as 70 percent were appreciated for value added pearl millet and highly purchasing women were under the age groups of 41-53.

Yang *et al*. 2012 suggested that millets are major source of energy mostly in dry countries and reported that millet has many nutritional - medical functions.

Consumption of millet plays an important role in human diets to reduce the nutritional imbalances.

Shukla and Srivastava (2011) prepared noodles using finger millet as a main ingredient mainly for diabetic patients. The glycemic Index was significantly lower (45.13) than control noodles (62.59) regarding 30 percent finger millet incorporated noodles. The results of the study concluded that consumption of finger millet flour incorporated noodles to be highly nutritious and have hypoglycemic effect.

The increase in demand from consumers for nutritious snacks has provoked the food manufacturers to formulate different types of snack bars that provide nutrition and convenience. It is essential for school-going children to consume nutritious foods due to their enhance body development requirements. Food consumed by them should be adequate in vitamins, minerals and balanced regarding major nutrients like carbohydrates, proteins and fats. The nutritional gaps need to be fulfilled by developing and encouraging products from functional foods (Nadeem, 2012).

The emerging principal uses of millets as an industrial raw material include production of biscuits and confectionery, beverages, weaning foods and beer (Laminu *et al*., 2011 and Anukam and Reid, 2009). Grits, flour, and meals from cereals such as millet, sorghum, and corn are now common items in the market.

Basavaraj *et al.* (2010) conducted a study on the availability and utilization of pearl millet production. Findings revealed that the value of pearl millet consumption and production was improved especially in alternative uses in agricultural and allied industries. The consumption of millets is affected by several socio demographic factors such as income, education, urbanization and cultural preferences.

Deshmukh *et al.* (2010) had observed on marketed surplus and price spread in different channels of pearl millet marketing in Beed district. Findings of the study revealed that 35.02 percent overall share of consumption was comprised of pearl millet.

Surekha (2004) concluded that the barnyard millet based health mix would be an ideal food for the obese and diabetics as it showed a significant reduction in blood glucose level (7%), improved lipid profile and reduction of body weight (mean/kg) during a 28 days feeding experiment to obese diabetics.

Majority of the consumers believed that consumption of millet was better than wheat and rice and in terms of nutritive value, a few believed that wheat and rice are superior to millets. The studies revealed that the nutritional and health implications of millets are being realized by the people of all income groups.

2.2.3 Consumer acceptance and satisfaction about millets

The extent to which a consumer used a product or service offered was termed as consumer acceptance. Consumer Satisfaction was defined as a measurement that determines a product or services provided by a company meet customer expectations. Satisfaction is one of the most important indicators of consumer purchase intentions and loyalty. Acceptance is the act of accepting, receiving something offered with satisfaction or approval while satisfaction is the fulfilment of a need or desire.

Marak *et al.* (2019) developed cookies from foxtail flour and ginger powder with different proportions of incorporation like 20, 30, 40 percentages and 5, 10, 15 percentages respectively and those cookies were compared with the 100% wheat flour cookies. The analysis showed that 30% foxtail millet and 10% ginger powder incorporated cookies were best accepted. Nutritional analysis of 30% foxtail millet cookies was energy - 576kcal, carbohydrate - 28.91g/100g, crude protein - 30.42 and sodium-296.03mg/100g.

Rajput *et al.* (2019) conducted a study on consumer acceptance regarding millet based products. To achieve nutritional consumption of food and also to fight against health complications of this generation, different attributes influencing consumer buying behaviour towards millet products were identified and for school children novel foods were developed from millets. The results revealed that more acceptances by students were for malted drink of kodo millet and mostly teachers preferred sweet balls of puffed millets.

Sedentary lifestyle and a change in work format, extreme advancement in technology were the main reasons for rise in demand of nutritious snacks that can be consumed. In recent years, the consumption of cereal bars as portable snacks was increased nearly by 11 percent across the globe (Bhakha *et al.,* 2019).

Hama - Ba *et al.* (2018) worked on the study of the nutritional quality and acceptability of millet biscuits supplemented with cowpea and bambara groundnut. The

study concludes that high energy biscuits of 50 percent supplementation with legumes were unpleasant and 50% cowpeas biscuits had very bad odour.

Amarapukar and Banakar (2017) worked on consumer preference towards foxtail millet products. Findings of the study revealed that the main purchasing factors were 68% preferred them as staple food and only 32 percent consuming by doctor's advice. Nutritional content was the major reason for increased consumption pattern of millets.

Kalidas and Mahendran (2017) had done a research on consumer buying behaviour towards instant millet-based products. Results have shown that 81.33 percent were satisfied, 9 percent were highly satisfied, 2.67 percent were dissatisfied, 6.67 percent were neutral and 58.67 percent have suggested to reduce the price. He suggested that for increasing sales of millet products extra quantity should be offered with the normal pack or freebies like the items useful for kitchen should be offered with the pack or reducing the prices will make the consumers to purchase more and more quantities.

Mathew *et al*. (2017) studied about the products made out of refined proso millet flour. By using refined proso millet flour (0%, 25%, 75%, and 100%) in varying amounts, biscuits and extruded snacks were developed. For 8 products i.e. 4 types of biscuits and extruded snacks types, sensory analysis was done in 2 separate tests (for biscuits and snacks). The results indicated that as the incorporation of millet flour amount in extruded snacks and biscuits was increased the liking of flavour, texture and overall acceptability had decreased.

Mehra and Singh (2017) explored on the sensory and nutritional evaluation of biscuits prepared from pearl millet. Results showed that overall acceptability was 7.5 - 8.7 found to be liked very much.

Sambavi *et al.* (2015) had formulated cookies with a different ratio of foxtail millet flour and wheat flour 60%, 50% and 45%. The evaluation of cookies showed that the more acceptable combination was 55 percent foxtail millet and 45 percent wheat flour sample. The best formulation had 4.6 percent moisture, 5.7 percent crude fat, 13.1 percent crude protein, 0.07 percent crude fiber and 1.0 percent ash in the cookies.

Shadang and Jaganathan, (2014) had conducted a study on baked products like cake, biscuits and cookies and that were prepared by using foxtail millet, finger millet,

proso millet and pearl millet added with wheat flour in the ratios of 10:90, 20:80 and 30:70 for both biscuit and cake. For cookies, the flours were used in the ratios of 15:85, 20:80 and 25:75. Foxtail millet exhibited good storage stability but pearl millet had less shelf life than foxtail millet due to high amount of moisture and sugar content. Biscuits, cakes and cookies made from pearl millet were highly acceptable than foxtail millet.

Sulthana (2014) had explored about the consumer acceptability and demand for millet-based foods. Findings revealed that all the respondents have agreed jowar based food products are healthy and was good for adults, children and elderly people. Nearly 90 per cent of the children group targeted liked sorghum biscuits mostly. The results showed that there is a need to generate awareness for a large consumer acceptance and to increase the consumption of millet products.

Using optimized flours of red, white sorghum and pearl millet, breakfast items were developed as instant cereals. Findings of the study revealed that they are highly accepted by the consumers as it contains more nutritional attributes in comparison to other similar products available in the market (Akoth *et al*. 2012).

Kulkarani *et al.* (2011) developed value added millet based traditional food products and their acceptability was tested. The products developed were proso millet based sweet pongal, and dosa with chakramuni leaves, little millet idli with methi leaves and carrot, little millet upma with drumstick leaves and with bengal gram leaves, foxtails millet vada with greens, barnyard millet based upma with drumstick leaves. For modern lifestyle the value added millet based traditional products are mostly accepted and considered as nutritious, cost effective, sustainable, and its acceptability was best to alleviate the hidden hunger.

Kumar *et al*. (2011) studied about the refined wheat flour (RWF) of five blends (63.2-96.8% RWF) along with millet. The refined flour was used to manufacture biscuits and baked at different temperatures of (166.6 -183.4˚c) and time (3.3-6.7min). Study revealed that crispiness and overall acceptability was increased while decrease of cutting strength and hardness was decreased along with the increase in baking time.

Muffins were also prepared by replacing wheat flour with 0, 20, 40, 60, 80, and 100% finger millet flour (FMF), emulsifiers, and hydrocolloids by Rajiv *et al*. (2011). Effect of finger millet, emulsifiers, and hydrocolloids on the batter microscopy,

theology and quality characteristics of muffins was also studied. They found that a combination of additives with 60 percent FMF significantly improved the volume, quality characteristics of muffins and were more acceptable.

Saha *et al.* (2011) had prepared biscuits and evaluated for dough characteristics and quality of the biscuit. They were developed using composite flours containing 60:40 and 70:30 of finger millet: wheat flour. It was observed that composite flour of finger millet: wheat flour (60:40) was highly accepted.

Srinivasulu (2011) aimed to do the market assessment and consumer acceptability of processed millet products. Study revealed that all the millet products scored excellent rank. All the respondents agreed that jowar foods were healthier and consumers have loyalty only on some brands to make purchase decision.

Anju and Sarita, (2010) evaluated the preparation of biscuits based on foxtail millet and barnyard millet and also to evaluate their sensory quality, acceptability, nutritional value and glycemic index by comparing with refined wheat flour biscuits. The study indicated that the shelf life of biscuits made from both types of millet flour can be successfully stored and are highly acceptable.

A study on development of cake using malted ragi flour by Anuradha *et al*. (2010) revealed that enriched cake was rich in minerals like iron, phosphorous, calcium and crude fibre. The developed cake with a ratio of 50:50 (wheat: malted ragi) and sensory score was similar to the control sample. The cake prepared with 50:70 ratio showed lower sensory score and highest fiber content. Thus increased acceptability and intensity of brown color in cake was due to malted ragi.

Vijayakumar *et al.* (2009) had conducted a study to expand the utility of kodo and barnyard millets by incorporating them in whole wheat flour, soya flour mixture and studied the impact of millet flour blend on different qualities of chapathi. It was concluded that 30% millet flour blend incorporated composite flour based chapathi was highly acceptable.

Gupta et al. (2008) developed a ready-to-eat extruded food with blends of Indian barley and rice using a single-screw laboratory extruder having barley flour (10–30%). Sensory scores indicated that barley flour content at 20%, feed moisture content at 30%, and die temperature at 175 o C resulted in an acceptable product.

A study conducted by Varnashree *et al.* (2008) had prepared idlis using ragi flour. Black gram dhal flour and parboiled rice was also used along with ragi flour in different ratios. In the preparation of idli, rice can be replaced with ragi without effecting on the quality parameters thereby improving the nutritional quality and thus, increased consumer acceptability.

Gitanjali *et al.* (2004) revealed that malted ragi flour, wheat, cooked rice, dhal, sprouted green gram, and jowar roti to be good sources of phenolics which along with fiber would reduce chronic disease. It was shown that the consumption of these whole grain products mostly increase the average daily antioxidant intake.

Ballolli *et al.* (2001) had prepared nutraceuticals enriched barnyard millet cookies by incorporating nuts and dry fruits. The barnyard millet cookies were highly acceptable due to its light and crisp texture, pleasant aroma and excellent taste. Barnyard millet cookies with light and crisp texture, pleasant aroma and excellent taste were highly acceptable.

From the above reviews it can be concluded that millet has progressively more vital role in modern lifestyle, due to the convenient forms such as ready-to-eat food products. Consumer tendency to eat nutritious foods instead of fast foods has led to the development of different snack bar types. As millet consumption extends beyond breakfast at any time of the day, hence acceptability and consumption of functional foods were increasing in the market. Review of literature revealed that very few acceptance studies have been conducted particularly in the schools, hence the present study was proposed.

Chapter III

MATERIAL AND METHODS

This chapter provides the detailed information about the process in which the data was collected, analyzed and discussed for the research on "**EVALUATIVE STUDY ON CONSUMER ACCEPTANCE AND SATISFACTION REGARDING THE MILLET BISCUITS AMONG CHILDREN IN SOCIAL WELFARE SCHOOLS (TSWREIS)".** Consumer demand for food is an important factor in formulation of various new processing methods. Nutrition and health issues appear to be major concerns about the nutritional content of foods. This study was conducted by reviewing the related literature to outline the objectives of the study. The adopted methodology to conduct the study was presented under the following heads.

3.1 Research Design

3.2 Sampling procedure

3.3 Variables and their Empirical Measurement

3.4 Selection of tool

3.5 Data analysis

3.6 Statistical analysis and Interpretation

3.1 Research Design

Research design works as a systematic plan outlining the study and it is the conceptual structure within which research is conducted and to list out the research methods techniques chosen by the researcher. According to Kothari (2008), Research Design is a plan, a blueprint of investigation done to obtain answers to the research questions. The arrangement of conditions for collection and analysis of the data in a manner to combine relevance to the research purpose with economy in procedure.

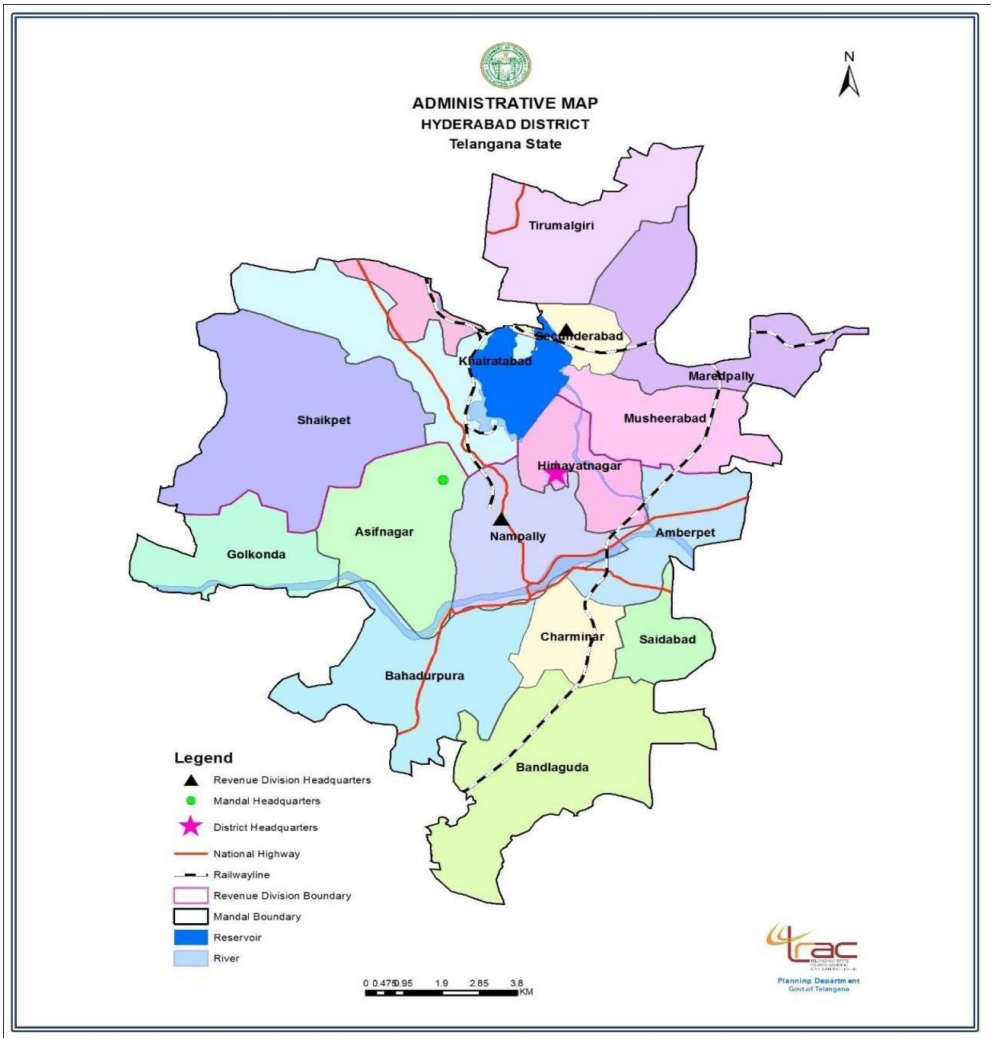
Exploratory Research Design was adopted to conduct the study. Exploratory research design was conducted for a research problem when the researcher has no past data or only a few studies for reference. This research was flexible and provides the initial groundwork for future research and it was conducted in order to determine the nature of the problem and helps the researcher to develop a better understanding of the problem. This kind of research design was adopted to explore the consumer acceptance and satisfaction regarding the Millet biscuits among children in Social-welfare schools.

3.2 Sampling procedure

The Hyderabad and Nagarkurnool districts of Telangana state, both urban and rural areas. Multistage sampling technique was uesd for the study as investigator was familiar with the local language, which would help to build good rapport with respondents of the study and enables to conduct the survey efficiently.

3.2.1 Locale of the study

The total two regions (urban and rural) were purposively selected for the study, i.e. Shaikpet and Mahendrahills of Hyderabad district from urban region and Achampet and Mannanur from of Nagarkurnool district from rural region.



https://hyderabad.telangana.gov.in/map-of-district/

Figure 3.1 Hyderabad (Shaikpet and Mahendrahills)

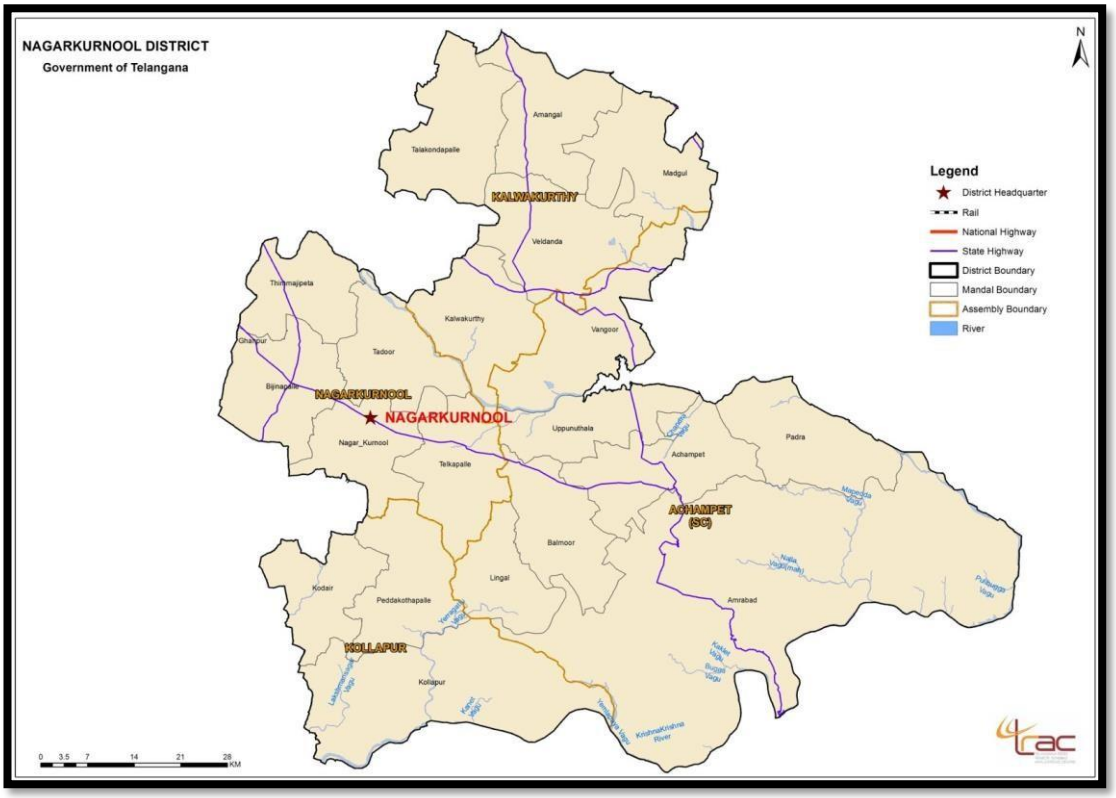


Figure 3.2 Nagarkurnool (Achampet and Mannanur)

3.2.2 Selection of the sample

Sampling is the method of selecting number of respondents for a study in such a way that they represent the larger group of population. Purposive sampling method was adopted. As it is a kind of non-probability sample, which is based on the typicality of the cases to be included for the study. Consumption of millet biscuits by students were purposively chosen, as they were the consumers of these products and reliable data can be obtained regarding their satisfaction about millet biscuits. The list of schools that who were supplied millet biscuits for students as snacks in Hyderabad and Nagarkarnool districts was collected through Millet Processing and Incubation Centre (PJTSAU). Among two districts from this list, four schools were selected from urban and rural regions. A total of one hundred and twenty students i.e. from Shaikpet -30, Mahendrahills -30, Achampet -30 and Mannanur -30 were selected in Hyderabad and Nagarkurnool districts to study the consumer acceptance and satisfaction of millet biscuits in TSWREIS. The key informants for the study were the students of TSWREI

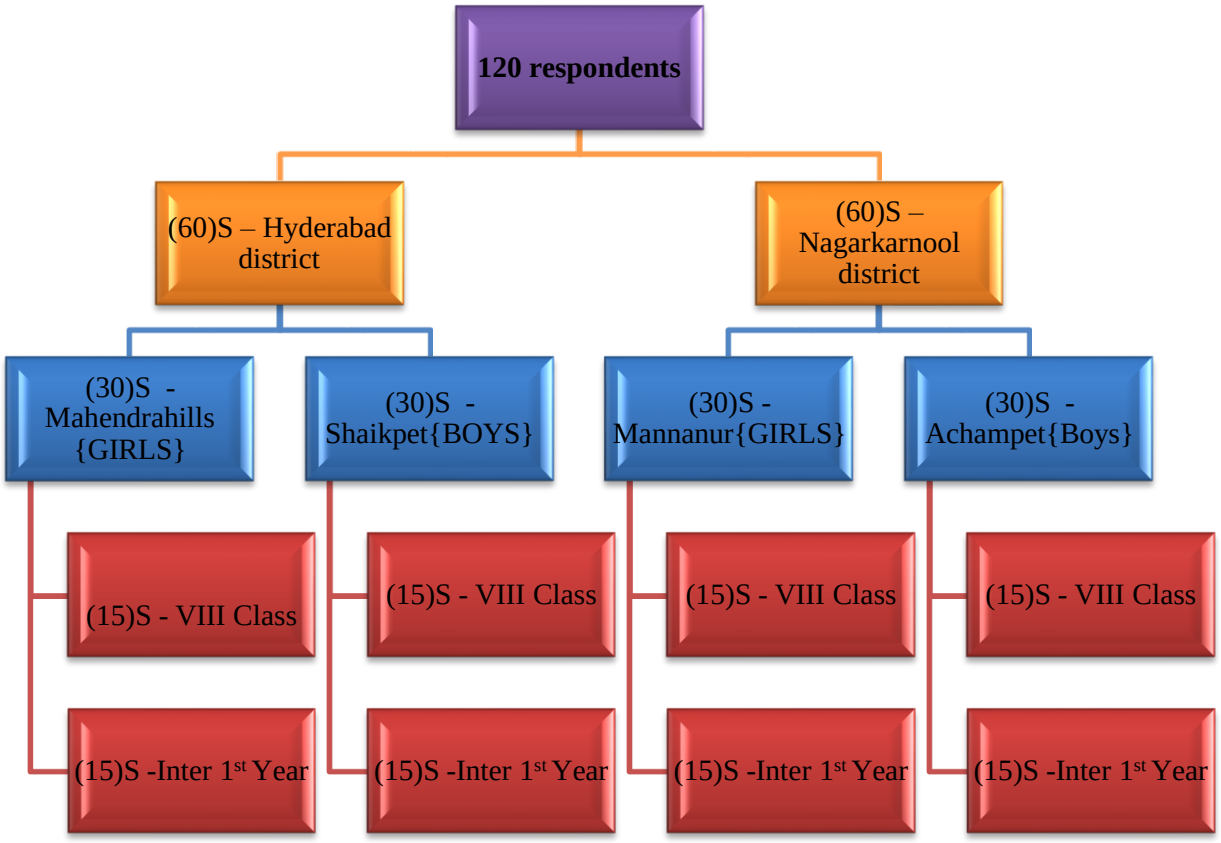


Figure 3.3 Selection of sample for the study

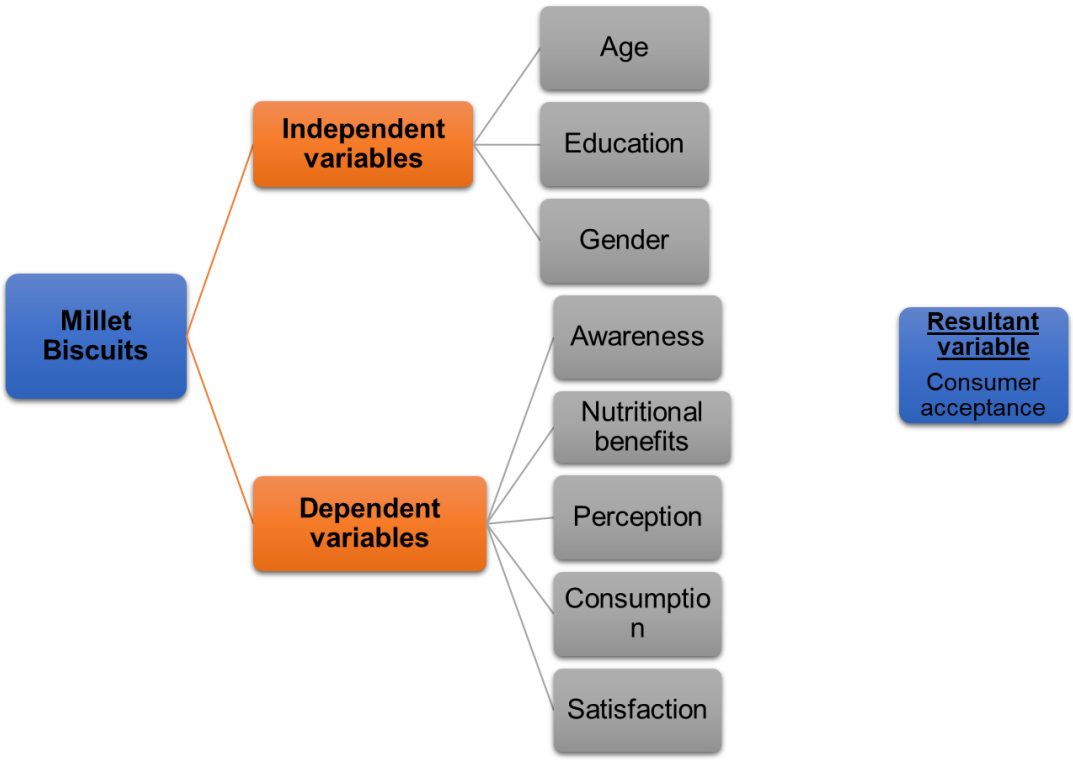


Figure 3.4 Conceptual frame work for the study

3.3 Variables and their Empirical Measurement

Variables for this study were selected based on the review of literature and objectives of the study. Interview Schedule was developed for the study. Variables that have relevance in the present investigation were included in the study. Variables selected for the study along with the empirical measurements were presented in table.

Table no. 3.1 Variables and their empirical measurement

S.No	Variables	Empirical Measurement
3.2.1	**Dependent variable**	
3.2.1.1	Awareness	Schedule was developed for the study
3.2.1.2	Taste preferences	Likert scale was developed for the study
3.2.1.3	Consumption level	Likert scale was developed for the study
3.2.1.4	Nutritional benefits	Schedule was developed for the study
3.2.1.5	Satisfaction level	Likert scale was developed for the study
3.2.2	**Independent variable**	
3.2.2.1	Age	Schedule was developed for the study
3.2.2.2	Education	Schedule was developed for the study
3.2.2.3	Gender	Schedule was developed for the study

3.2.1 Dependent variable

3.2.1.1 Awareness

Dependent variable for this study was selected based on the review of the literature and schedule was developed for the study. According to the review of literature, factors for the awareness level were framed. It comprised of three factors i.e. Aware of benefits, knowledge about availability, source of information. Under the awareness about benefits factor, seven statements were included followed by two statements under knowledge about availability and five statements were included under the source of information. Based on the responses given by the users on those statements we have calculated the awareness level through frequencies and percentages.

3.2.1.2 Taste preferences

According to the desk research, taste preference was selected as dependent variable and likert scale was developed for this study. To determine the degree of preference, various factors were listed out. It contains four factors i.e. Attributes, choice of health, Preference towards Millet biscuits, Perception on future demand. Based on the responses given by the users on those statements we have calculated the taste preferences. The preference level were classified as Liked very much (5), Liked moderately (4), neither liked or nor disliked (3), Disliked Moderately (2), highly Disliked (1). Each statement on the scale carries a score. Response indicating the high favorable degree of preference was given the highest score i.e. 5 and least degree of preference was i.e. Data was collected from one hundred and twenty respondents. It was assumed that, if all the respondents express high preference for the statement, the maximum score that would be obtained is120x5=600; similarly if all the respondents express low preference for the statement the minimum score that would be obtained for that statement is 120x1=120.

Based on the responses given by the users on those statements, calculated the perception on future demand regarding Millet biscuits. The perception on future demand was classified as Yes (2), No (1) and No idea (0). Each statement on the scale carries a score. Response indicating the high favorable degree of perception was given the highest score i.e. 2 and least degree of perception i.e. 0. It was assumed that if all the respondents express high perception for each statement the maximum score that would be obtained for each statement is 120X2=240; similarly if all the respondents express

low perception for each statement the minimum score that would be obtained for each statement is 120X0=0. The score on each statement would fall between 240 and 0.

3.2.1.3 Consumption level

Consumption is the action of using up a resource and the consumption value enhances the level of satisfaction. Based on earlier research studies, various factors for the consumption were outlined and likert scale was developed for the study. It includes six factors i.e. Period of consumption, preference about meal pattern for millet consumption, frequency of consumption, daily consumption, number of biscuits per day, constraints faced in consumption. Based on the responses given by the users on those statements we have calculated. The factors influencing consumption of millet biscuits were rated as High priority (3), Medium priority (2) and Low priority (1). Each statement on the scale carries a score. Response indicating the high favorable degree of consumption was given the highest score i.e. 3 and least degree of consumption was 1. Data was collected from one hundred and twenty respondents. It was assumed that, if all the respondents express high consumption for each statement the maximum frequency that would be obtained will be 360, similarly if all the respondents express low consumption for each statement the minimum frequency that would be obtained for that statement will be 120.

3.2.1.4 Nutritional benefits

Nutritional benefits were selected as one of the dependent variable and Interview Schedule was developed for the study. Based on the collected reviews, four factors were framed to understand the nutritional benefits of millet biscuits i.e. noticed any health benefits, experienced nutritional benefits, noticed any health problems, experienced health problems. Based on the responses given by the users on those statements the Nutritional benefits of millet biscuits were calculated using frequencies and percentages.

3.2.1.5 Satisfaction Level

Consumer satisfaction is the leading indicator to measure consumer loyalty and their view on a particular product. Hence, it was selected as dependent variable for the study and likert scale was developed for the study. According to the review of literature, factors for the satisfaction level were framed. Thus, the total scale was comprised of 9 statements. Based on the responses given by the users on these statements we have

calculated the consumer satisfaction level. The satisfaction degrees were classified as Yes (2), No (1), no idea (0). Each statement on the scale carries a score. Response indicating the high favorable degree of satisfaction was given the highest score i.e. 2 and least degree of satisfaction was i.e. 0. Data was collected from one hundred and twenty respondents. It was assumed that if all the respondents express high satisfaction for each statement the maximum score that would be obtained for each statement is 120X2=240; similarly, if all the respondents express low satisfaction for each statement the minimum score that would be obtained for each statement is 120X0=0. The score on each statement would fall between 240 and 0.

3.2.2 Independent variables

3.2.2.1 Age

The completed number of years of age as on the date of data collection was considered as age of the respondent. The categorization was done based on chronological age. The Respondents age was classified into two categories (12-15 years) and (16-19 years).

3.2.2.2 Education

Education refers to the formal education level of the Respondents. A schedule was developed to measure the education level of the student. This was furnished in the demographic information. Educational level of the respondents was classified into two categories namely Eighth class and Inter 1st year.

3.2.2.3 Gender

It is an independent variable used in statistics to predict or explain a dependent variable. The Gender of the Respondents was classified into 2 categories namely Male and Female.

3.4 Selection of tool

Interview schedule come Likert scale was adopted as tools for data collection.

3.4.1 Interview schedule

The tool developed for collecting the data from the respondents in the presentstudy was structured interview schedule. Keeping in view the objectives and different variables included in the study, the developed structured interview schedules were modified. A data collection technique or tool used for the study, in

which the interviewer directly meets the interviewee and asks the questions related to the research topic. Interviewers were oriented, trained and sent out with complete instructions as to whom to interview and how it is to be handled.

Structured interview schedule was developed to collect the data regarding the availability, accessibility and control over resources and assets. According to Corbetta (2003) interviews in which all respondents were asked with the samewording, with the same questions and also in the same sequence. Interview schedule was used for collecting the demographic profile and general information about MilletBiscuits.

3.4.1.1 Likert Scale

It is a type of rating scale used to measure attitudes or opinions. Using this scale, respondents were-asked to rate items on a level of agreement. The respondents express their level of agreement or disagreement on a scale for a series of statements. The Likert- Scales consist of a number of statements which express either a favorable or unfavorable attitude towards the given object to which the respondent is asked to react. The respondent indicated his satisfaction or dissatisfaction with each statement in the instrument. Each response was given a numerical score, indicating its favorableness or unfavourableness, and the scores were summed to measure the respondent's position on the continuum of satisfaction or dissatisfaction with the Millet biscuits.

Similarly, 5 point continuum was used for elucidating the various attributes of millet biscuits. Five score was given for liked very much, 4 for liked moderately, 3 for neither liked or nor disliked, 2 for disliked moderately and 1 for highly disliked with the respective statements.

3 point continuum was used while understanding the perception on future demand regarding millet biscuits, respondents were asked to indicate reasons for perception as Yes (2 score), No (1 score) and No idea (0 score). It is also used for detecting the factors influencing for the Consumption of Millet biscuits through high priority (3 score), medium priority (2 score) and low priority (1 score).

Three point continuum scale was also used to understand the reasons for Satisfaction regarding millet biscuits as Yes (2 score), No (1 score) and No idea (0 score).

3.4.2 Method of Data Collection

The data was collected by administering the structured interview schedule to the respondents. The statements were asked in Telugu and English. The respondents were personally interviewed by the investigator, which enabled her to get first hand information and provided her an opportunity to observe their opinions. It was made sure that the statements mentioned in the schedule were correctly understood by the students by repeating and clarifying them where ever necessary. A friendly and healthy atmosphere was maintained throughout the interview so that the respondents were at ease and expressed their opinion fairly, freely and frankly. The data was collected with regarding to the objectives i.e. consumer awareness regarding –benefits of millet biscuits, consumer acceptance of Millet biscuits, Taste preferences between girls and boys regarding millet biscuits and consumer level of satisfaction of Millet biscuits.

Figure 3.5 Personal Interview with students (TSWREIS) for collecting data

3.5 Data analysis

Analysis means a critical examination of the assembled and grouped data for studying the characteristics of the object under study and for determining the patterns of relationships among the variables related to it. The data was coded, tabulated and analyzed through percentages and Correlation test. The relationship between different independent and dependent variables was interpreted through the data that was collected through the interview schedule.

3.6 Statistical analysis and interpretation

Statistical analysis was carried out to find out the relationship and associations between the variables. The data thus collected was coded and analyzed with the help of the following Statistical methods.

3.6.1 Frequencies

Frequency was used to know and understand the distribution pattern of the respondents according to the variables.

3.6.2 Percentages

Some of the data were subjected to frequencies and percentages and it is used to know the distribution of respondents according to their variables.

3.6.3 Correlation test

A statistical method used to evaluate the potency of relationship between two quantitative variables. It is used mainly to quantify the degree to which two variables are related. Pearson's correlation coefficient is denoted by r, is used to demonstrate whether two variables are correlated or related to each other. Correlation was used to find out the extent of the relationship between the independent variables and dependent variables.

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n(\sum x^2) - (\sum x)^2]\,[n(\sum y^2) - (\sum y)^2]}}$$

r = coefficient of correlation between x and y

Σx = sum of the independent variable x

Σy = sum of the dependent variable y

Σx^2= sum of the squares of x variable

Σy^2= sum of the squares of y variable

n= size of the sample.

The computed r values were then compared with the tabulated values at 1 and 5 percent levels of significance.

Tests of significance

In statistics, it is important to know if the result of an experiment is significant enough or not. In order to measure the significance, there are some predefined tests which could be applied. The significance level is the level at which it can be accepted if a given event is statistically significant. This is also termed as p-value. The significance is the probability that a relationship exists. Significance tests tell us about the probability that if a relationship we found is due to random chance or not and to which level. This indicates about the error that would be made by us if they found relationship is assumed to exist.

Chapter IV

RESULTS AND DISCUSION

This chapter highlights the findings of the investigation and their interpretation. After collecting the data with regard to the objectives, profile characteristics of students, awareness and consumption level in relation to millet biscuits. Reasons for satisfaction, taste preferences and nutritional benefits was analyzed and tabulated. The results thus obtained are presented, along with interpretations under the following sections.

4.1 Profile and general information of the students
4.2 General awareness regarding millet products
4.3 Consumption pattern regarding millet biscuits
4.4 Factors influencing the acceptance of millet biscuits
4.5 Taste preference regarding millet biscuits
4.6 Various attributes regarding millet biscuits
4.7 Nutritional benefits on consuming millet biscuits
4.8 Satisfaction level in relation to millet biscuits
4.9 Reasons for satisfaction about millet biscuits
4.10 Hypothesis testing between independent variables and dependent variables

4.1 Profile and general information of the students

4.1.1 Profile of the respondents

This section deals with the findings and discussion regarding the profile characteristics of the respondents from two districts in Telangana. Profile of the respondents included age, education, gender, family type and family size. Distribution of the respondents under different categories were based on their profile characteristics was presented in the tables.

4.1.2 General information of the respondents

It refers to the general information like education, occupation and monthly income of the head of the family.

Table 4.1 Distribution of respondents according to the Education of Head of the family

Education of Head of the Family	F(N=120)	%
Profession or Honors	8	6.60
Graduate or Postgraduate	6	5.00
Intermediate or Post High School Diploma	21	17.50
High School Certificate	40	33.30
Middle School Certificate	26	21.60
Primary School Certificate	13	10.80
Illiterate	6	5.00
Total	120	100.00

(App Table. B - Kuppuswamy Scale, 2020)

Table 4.1 revealed that one third (33.30%) of the head of the families had education up to high school level followed by Middle School level (21.6%), Intermediate or Post High School Diploma (17.5%), Primary School level (10.8%), Profession or Honors (6.6%), Graduate or Postgraduate (5%) and only negligible proportion were Illiterates (5%).

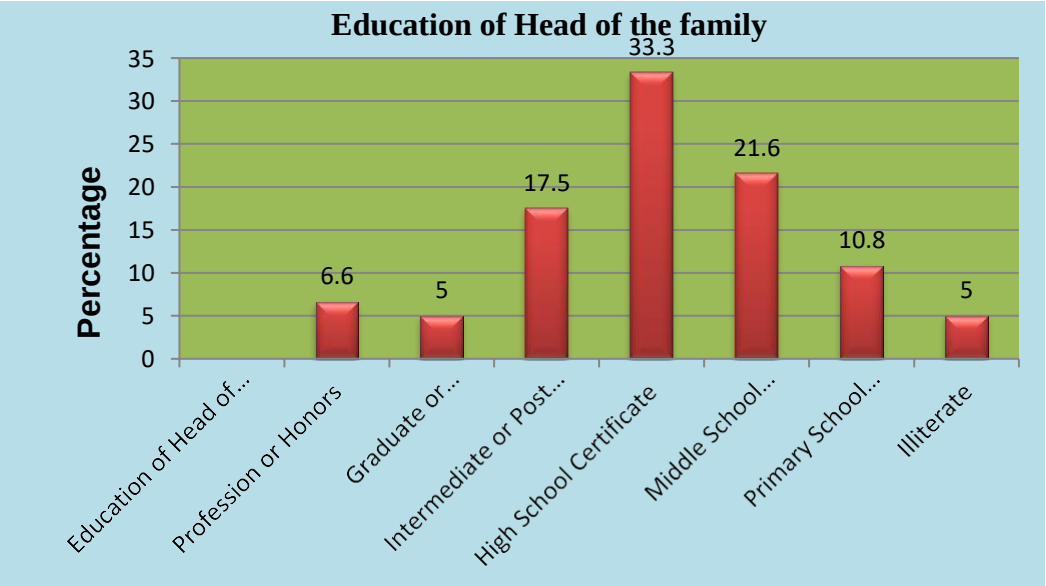


Figure 4.1 Distribution of respondents according to the education of the head of the family

Table 4.2 Distribution of respondents according to the occupation of Head of the family

Occupation of Head of Family	F(N=120)	%
Profession	4	3.33
Semi-profession	9	7.50
Clerical, Shop-Owner	27	22.50
Skilled worker	20	16.60
Semi-skilled worker	32	26.60
Unskilled worker	17	14.16
Unemployed	11	9.16
Total	120	100.00

(App Table. B - Kuppuswamy Scale, 2020)

From table 4.2 one fourth of the head of the families were semi-skilled workers followed by (22.5%) clerical/shop-owners. More or less an equal percentage of respondents were (16.6%) skilled and (14.16%) unskilled workers, very less percentage were (9.16%) unemployed, (7.5%) semi-professionals and only the negligible percentage were professionals (3.33%).

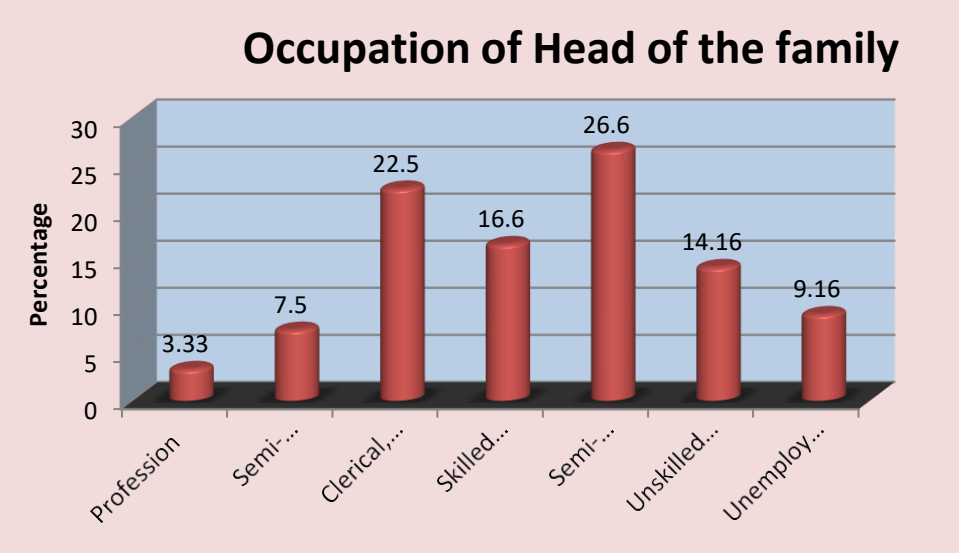


Figure 4.2 Distribution of respondents according to the occupation of the head of the family

Table 4.3 Distribution of respondents according to the monthly income of the family

Monthly Income of Family	F(N=120)	%
<20000	37	30.83
20000-50000	47	39.16
50000-100000	17	14.16
>100000	19	15.83
Total	120	100.00

(App Table. B - Kuppuswamy Scale, 2020)

From table 4.3 Monthly income of the family was calculated by considering the income of all the earning members. Table 4.1 indicates that nearly 40 per cent of the families were earning Rs.20,000-50,000 pm and one-third of them were (30.83%) earning less than Rs. 20,000 pm while 15.83 per cent were earning greater than Rs.1,00,000 pm and negligible proportion (14.16%) of the families were earning Rs.50,000-1,00,000 pm.

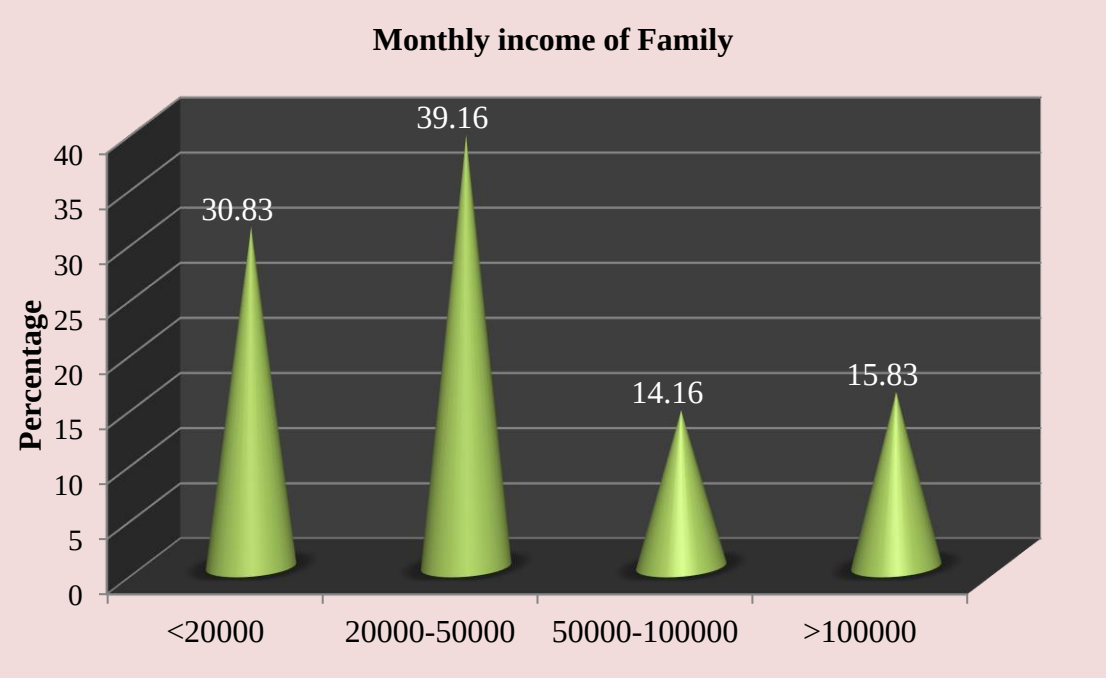


Figure 4.3 Distribution of respondents according to the monthly income of the family

Source of above classification is adopted from most usually used scale for determining the socio economic status of the family i.e. Kuppuswamy scale. It was developed for assessing the socio economic status of an individual. The scale includes mainly three parameters namely education, occupation and income of the individual. The total was calculated by adding up all the three scores from education, occupation and total family income parameters. Based on the values obtained, families were placed in the socio economic class as explained in the following table.

Table 4. 4 Distribution of respondents according to their socio economic status

S.NO	Socio Economic Class	F(N=120)	%
1	Upper class (26-29)	-	-
2	Upper middle (16-25)	6	5.00
3	Lower middle (11-15)	54	45.00
4	Upper lower (5-10)	57	47.50
5	Lower class (below 5)	3	2.50

(App Table. B - Kuppuswamy Scale, 2020)

Socio economic status was classified as upper, upper middle, lower middle, upper lower and lower class with their respective values as given in Kuppuswamy scale (Sharma, 2017). The above table concludes that majority of the families (47.5%) were from upper lower class followed by lower middle (45%), upper middle (5%) and only 2.5 per cent families were from lower class and none of them belonged to upper class.

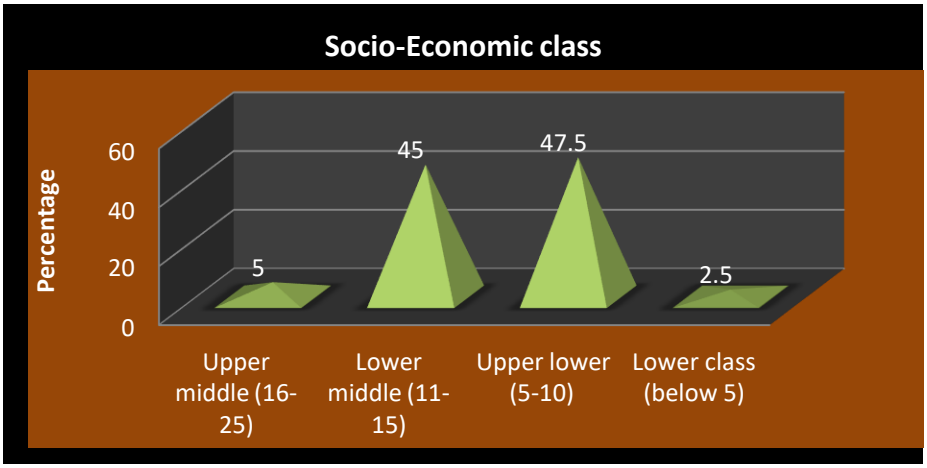


Figure 4.4 Distribution of respondents according to the socio-economic status of the family

Table 4. 5 Distribution of respondents according to their profile information

Age (in years)	F (N=120)	%
12-15 years	60	50.00
16-19 years	60	50.00
Total	120	100.00
Educational Level		
Secondary School	60	50.00
College Education	60	50.00
Total	120	100.00
Gender		
Male	60	50.00
Female	60	50.00
Total	120	100.00
Family type		
Nuclear	100	83.30
Joint	20	16.60
Total	120	100.00
Location		
Urban	60	50.00
Rural	60	50.00
Total	120	100.00

From the above Table 4.5, age of the students selected for the study was ranged between 12 to 19 years. Based on their age, the respondents were categorized into two categories namely 12-15 years and 16-19 years. Equal proportion of the respondents (50%) belonged to 12-15 years and 16-19 years.

The data presented in Table 4.5 indicates that the educational level of the respondents was classified into two categories namely secondary school (8^{th}class) and college (Intermediate Ist year) students. About half (50%) of the respondents belonged to secondary school education and the other half (50%) were studying in junior college. Thus the data in the above table reveals that all the respondents were educated. TSWREIS provided millet biscuits as snacks for students because the students knew the importance of Millet biscuits as they were consuming millet biscuits regularly.

The sample consisted of both male and female students. Equal number of male (60) and female (60) students were included in the sample. Thus, the sample consisted of fifty per cent of male and fifty per cent of female respondents. The findings of the study were similar with the study conducted by Jayawardana *et al.* (2020) who studied about consumer awareness and preference towards finger millet in Sri Lanka found nearly 45.4 per cent male and 54.6 per cent female in his study.

Based on the type of the family, the respondents were classified into two categories namely nuclear families and joint families. It is evident from the Table 4.5, that 83.3 per cent of the respondents belonged to nuclear families while 16.6 per cent were joint families. The minimum number in nuclear families were 2 members and maximum 5 members, while joint families had minimum 6 members and maximum of 15 members.

Based on the location, the sample was classified into two categories namely Urban (Hyderabad district) and Rural (Nagarkurnool district) respondents. The data presented in table 4.5 indicates that equal percentage of sample belonged to urban (50%) and rural (50%) areas.

4.2 General awareness regarding millet products

This section deals with the findings and discussions regarding the awareness about Millet products. General awareness about millet products includes awareness level of millet products, knowledge about availability of millet products in market, aware of benefits of millet biscuits and millet products and source of information.

Table 4.6 Distribution of respondents according to the general awareness regarding millet products

*a. Aware of millet products	F(N=120)	%
Rusk	20	16.60
Cakes	4	3.33
Biscuits	120	100.00
Cookies	18	15.00
Muffins	13	10.80
Laddu	104	86.60

Flour	105	87.50
Roti	109	90.83
Muruku	88	73.30
Vermicelli	9	7.50
Rawa	23	19.16
Millet flakes	14	11.60
Ragi bites	14	11.60
Millet smoothix	5	4.16
***b. Aware of benefits of millet products**		
High protein content	43	35.83
Lowers high blood pressure	18	15.00
Good for Diabetics	107	89.10
More fiber content	103	85.80
Gluten free and non allergic	7	5.80
Rich in minerals vitamins	101	84.10
***c. Sources of information**		
Family	69	57.50
Neighbors /Friends	18	15.00
Exhibitions	14	11.60
Publicity In T.V &Newspaper	105	8.00
Any Other (school/hostel)	110	91.60
d .Knowledge about availability of millet biscuits		
Yes	21	17.50
No	99	82.50
Total	120	100.00
e. Aware of benefits of millet biscuits		
Yes	110	91.60
No	10	8.33
Total	120	100.00

*Total exceeds cent percent due to multiple responses

It was evident from Table 4.6 that respondents were aware of various millet products like biscuits (100%), roti (90.8%), flour (87.5%), laddu (86.6%), muruku (73.3%), rawa (19.16%), rusk (16.6%), cookies (15%), flakes and ragi bites (11.6%), muffins (10.8%), vermicelli (7.5%), millet smoothix(4.16%) followed by negligible proportion knew about cakes(3.33%). Contrary to these findings, Jayawardana *et al.* (2020) stated that only 33.9 per cent of the respondents were aware of the finger millet flour incorporated food products available in the market.

Data about awareness on benefits of millet products (table 4.6) revealed that 89 per cent perceived that millets were good for diabetes, as they had high fiber content (85.8%), rich in minerals and vitamins (84.1%), had high protein content (35.83%), lowers high blood pressure (15%) and were gluten free and non allergic (5.8%).

The sources of information regarding millet biscuits were classified into five categories. Maximum respondents (91.6%) got information about millet biscuits from school/hostel, 57.5 per cent from family, 15 per cent from neighbors / friends**,** 11.6 per cent from exhibitions and only 8 per cent through publicity in T.V and newspaper. However findings reported by Harshitha and Jayaram (2019) revealed that 62.52 per cent were aware through newspapers/ magazines, 48 per cent from by friends/relatives and only 43 per cent through TV/radio advertisements.

Table 4.6 showed that more than half (82.5%) of the respondents were doesn't have knowledge on availability of millet products in the market. Based on the level of awareness regarding benefits of millet biscuits, maximum respondents (91.6%) were aware and only least proportion of sample (8.33%) were not aware. Jayawardana *et al.* (2020) concluded that 57.5 per cent of the respondents were aware of the nutritional benefits of finger millet.

4.3 Consumption pattern regarding millet biscuits

This section deals with the findings and discussions regarding the consumption pattern of millet biscuits. It includes period of consumption, preference about meal pattern for millet consumption, frequency of consumption, number of millet biscuits consumed per day and the constraints faced while consuming.

Table 4.7 Distribution of respondents according to the period of consumption of millet biscuits

a. Period of consumption	F (N=120)	%
< 1 year	2	1.60
1-3 years	72	60.00
3-6 years	46	38.30
>6 years	-	-
Total	120	100.00

b. Preference about meal pattern for millet consumption		
Breakfast	5	4.16
Snacks	115	95.83
Dinner	-	-
Total	120	100.00
c. Frequency of consumption		
Daily once	-	-
Weekly twice	6	5.00
Once in a week	97	80.80
Once in a month	17	14.16
Total	120	100.00

The period of consumption was classified into four categories namely below one year, 1-3 years, 3-6 years and above 6 years. Table 4.7 shows that 60 per cent of the respondents consumed for 1 to 3 years and 38.3 per cent of the respondents consumed for 3 to 6 years followed by consumption below one year were by very minor proportion i.e. 1.6 per cent. Period of consumption above six years was nil as supply of millet biscuits was delayed from 2020 due to covid pandemic. Maximum (95.83%) preference about meal pattern for millet consumption was snacks and only few (4.16%) preferred millets as breakfast item. None of the respondents preferred millet products in their dinner.

Frequency of consumption was classified into four categories namely daily once, weekly twice, once in a week and **o**nce in a month. Results revealed that 80.8 per cent of the respondents were consuming millet biscuits weekly once and little more than one-tenth (14.16%) were consuming monthly once. Further analysis showed that only few (5%) of the respondents were consuming millet biscuits weekly twice. None of the respondents were consuming daily thus supported by the study of Jayawardana *et al.* (2020).

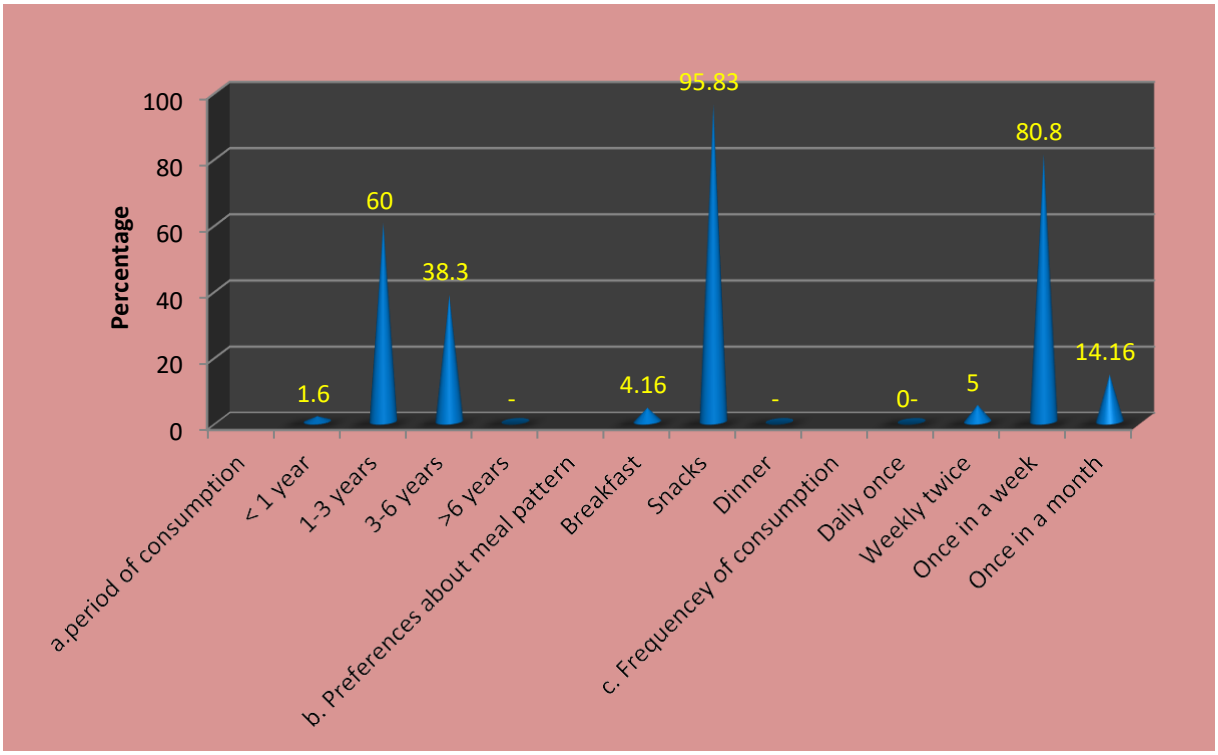


Figure 4.5 Distribution of respondents according to the period of consumption

Table 4.8 Distribution of respondents according to the frequency of consumption of millet biscuits

No. of MB / day	**F (N=120)**	**%**
5-10 biscuits	17	14.16
<5 biscuits	103	85.80
>10 biscuits	-	-
Not preferred	-	-
Total	120	100.00

MB/Day =Millet biscuits per day

Number of biscuits consumed per day was categorized into four patterns i.e. 5-10 biscuits, less than five biscuits, greater than ten biscuits and not preferred. Among all the respondents 85.8 per cent of the respondents were consuming less than five biscuits per day and only 14.16 per cent were consuming nearly 5-10 biscuits per day.

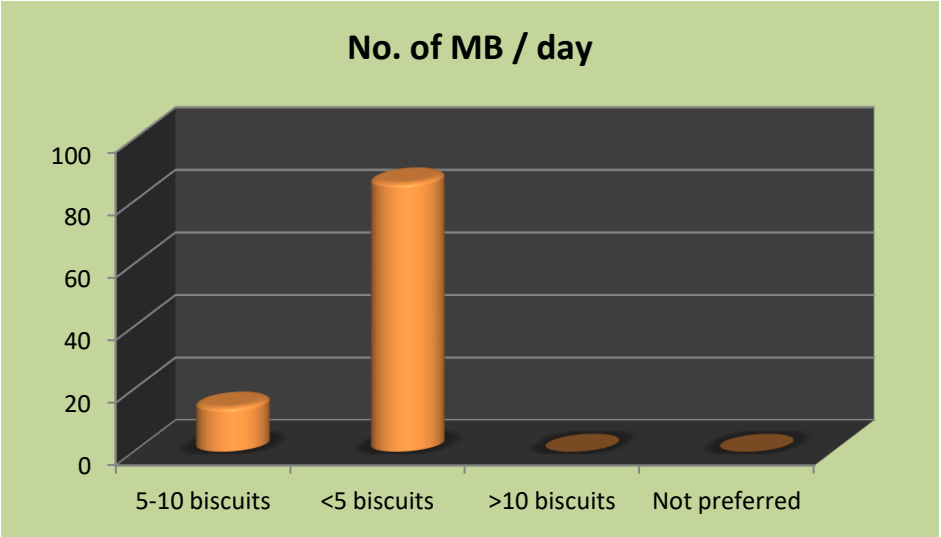


Figure 4.6 Distribution of respondents according to the frequency of consumption

Table 4.9 Distribution of respondents according to the constrains faced in availability of millet biscuits

Constraints faced	F (N=120)	%
Expensive	10	8.30
Non availability	100	83.30
No awareness	107	89.16
Non acceptability by children	15	12.50
Limited recipes	97	80.83
Poor Taste	6	5.00

* Total exceeds cent percent due to multiple responses

Though the production and supply of biscuits possibly good, there could be little constraints faced while consuming millet biscuits i.e. most of the respondents (89.16%) were not aware, 83.3 per cent were facing non availability, 80.83 per cent of the respondents were facing limited recipes as one of the constraints, 12.5 per cent of the respondents felt that non acceptability by children was also a constraint. Very few (8.3%) of them stated that millet biscuits were expensive and a negligible proportion (5%) of the respondents expressed that poor taste as a constraint in consuming millet biscuits.

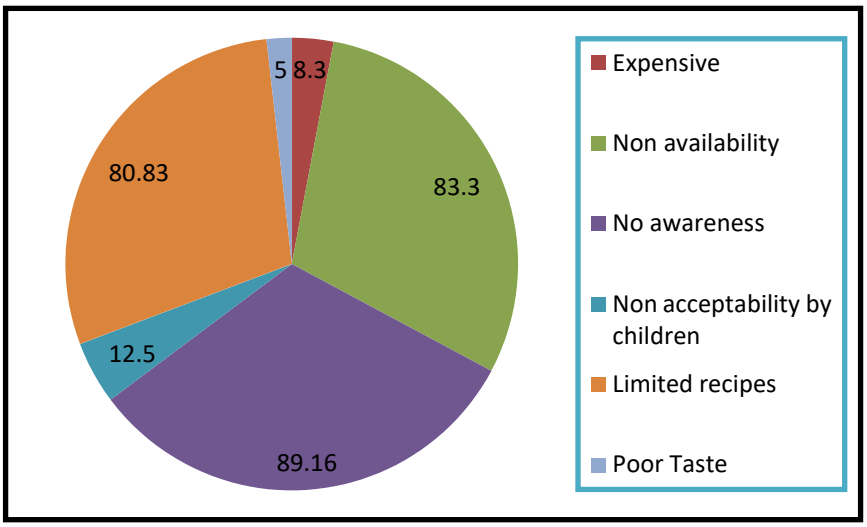


Figure 4.7 Distribution of respondents according to the constraints faced in availability

4.4 Factors influencing the acceptance of millet biscuits

Statements pertaining to the factors influencing the acceptance of millet biscuits were framed mainly to understand the factors or reasons that make the users to consume. This section primarily dealt with the factors for the acceptance of millet biscuits. Different factors for the acceptance of millet biscuits were elicited from the review of literature. The factors identified were health benefits, good taste, influence of neighbors and friends, interest towards innovative products, part of traditional diet, doctor suggestion, seller's promotional activities and interest towards new products. It also included product prices regarding millet biscuits and general maida biscuits.

Table 4.10 Distribution of respondents according to the factors influencing for the acceptance of millet biscuits

S. No.	a. Factors	High Priority (3)	Medium Priority (2)	Low Priority (1)	Total Score	Mean	Rank
1.	Health benefits	69	48	3	306	2.55	3
2.	Good Taste	100	20	-	340	2.83	1
3.	Influence of Neighbors & Friends	81	29	10	311	2.59	2

4.	Interest towards innovative products	2	69	49	193	1.60	7
5.	Part of traditional diet	61	30	29	272	2.26	5
6.	Suggested by doctor	1	7	112	129	1.07	9
7.	Sellers Promotional activities	2	12	106	136	1.13	8
8.	Interest towards new products	7	88	25	222	1.85	6
9.	Price of millet Biscuits	54	51	15	279	2.32	4

Factors that have contributed to consume millet biscuits were discussed under Table 4.10, respondents were asked to report on a three point continuum scale i.e. high priority (3), medium priority (2) and low priority (1). Each point on the scale carried a score. These score values were not printed on the instrument but they were shown here just to indicate the scoring pattern. Each statement was scored by 120 respondents on a 3 point scale. The maximum score earned on that statement was 120x3=360 i.e. high priority and minimum score earned on each statement was 120x1 =120 i.e. low priority.

Hence, the score for each statement would fall between 120 and 360. Ranking was given to each statement based on the total score of that statement. The total score was calculated on each statement separately by multiplying the score with the number of responses on all three categories and added up. Each statement's mean score was also calculated by dividing the total score with 120 respondents. The same method was followed for each statement thus, for all the eight statements mean was calculated.

The results revealed that good taste was the factor that ranked as high (1^{st} rank) for acceptance millet biscuits by the respondents. The most significant factor for consuming millet biscuits by influence of neighbors and friends (2^{nd} rank), health benefits (3^{rd} rank). The least important factor for consuming millet biscuits quoted was consumption as per doctor suggestion. Harshitha and Jayaram (2019) reported that average garret's ranking using the score i.e. 1^{st} rank for health value (70.10), followed by nutritional value (64.80), brand (52.65), low price (46.50) and traditional consumption (36.03). Most of the respondents mentioned that millet biscuits price was high compared to general maida biscuits.

Table 4.11 Distribution of respondents according to the overall consumer acceptance in relation to millet biscuits

This section deals with the findings and discussion regarding the level of acceptance about millet products. Level of acceptance was calculated by considering frequency of consumption and factors influencing the consumption of millet biscuits.

S.NO	Category	Level of acceptance	F	%
1.	>23	High	30	25.00
2.	20-22	Average	75	62.50
3.	Upto 19	Low	15	12.50

Scores obtained on these two parameters was added up for each respondent. Thus the possible acceptance score that can be obtained by each respondent ranges between 10 and 32. However maximum and minimum scores obtained by the sample were 25 and 18 respectively. Based on maximum and minimum score, level of acceptance was categorized into three levels i.e. High, average and low acceptance.

It is evident from table 4.11, Level of acceptance regarding millet biscuits revealed that 62.50 per cent of the respondents were expressed average followed by 25 per cent high acceptance and very few (12.5%) were felt low level acceptance.

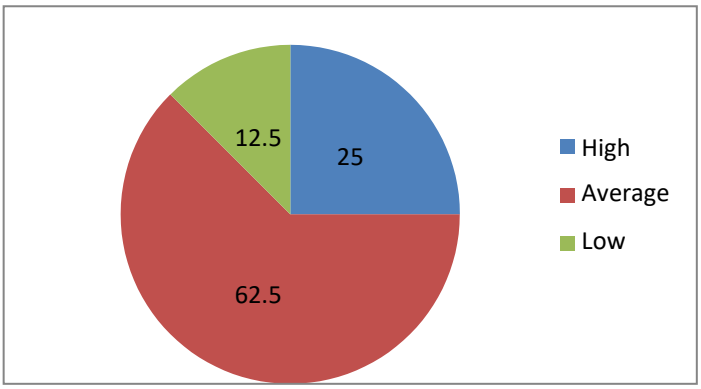


Figure 4.8 Distribution of respondents according to the Level of acceptance

4.5 Taste preference regarding millet biscuits

The present segment deals with the findings and discussions on respondents' perception regarding millet biscuits. User's perception includes factors like choice of health, preference towards biscuits and its perception on future demand.

Table 4.12 Distribution between girls and boys according to their taste preference

S.No	Preference towards Millet biscuits	Girls (F)	%	Boys (F)	%
1.	Liked very much	54	90.00	52	86.00
2.	Liked moderately	6	10.00	5	8.33
3.	Neither liked nor disliked	-	-	2	3.33
4.	Disliked Moderately	-	-	-	-
5.	Highly Disliked	-	-	1	1.60
6.	Total	60	100.00	60	100.00

Table 4.12, showed that regarding the taste of millet biscuits, more or less an equal proportion of taste preference was stated between girls and boys. Majority (90%) of the girls was liked very much and only ten per cent of the girls had liked moderately.

About eighty six per cent of the boys liked very much followed by liked moderately (8.33%), neither liked nor disliked (3.33%) and only negligible per cent (1.6%) highly disliked. From this table it can be concluded that both, girls and boys were preferred millet biscuits. Comparatively girls preferred more than boys. Jayawardana *et al.* (2020) supported the findings on preference towards consuming finger millet i.e. liked by majority of the respondents (46.7%), followed by 30.5 per cent neither liked nor disliked and 19.9 per cent liked very much.

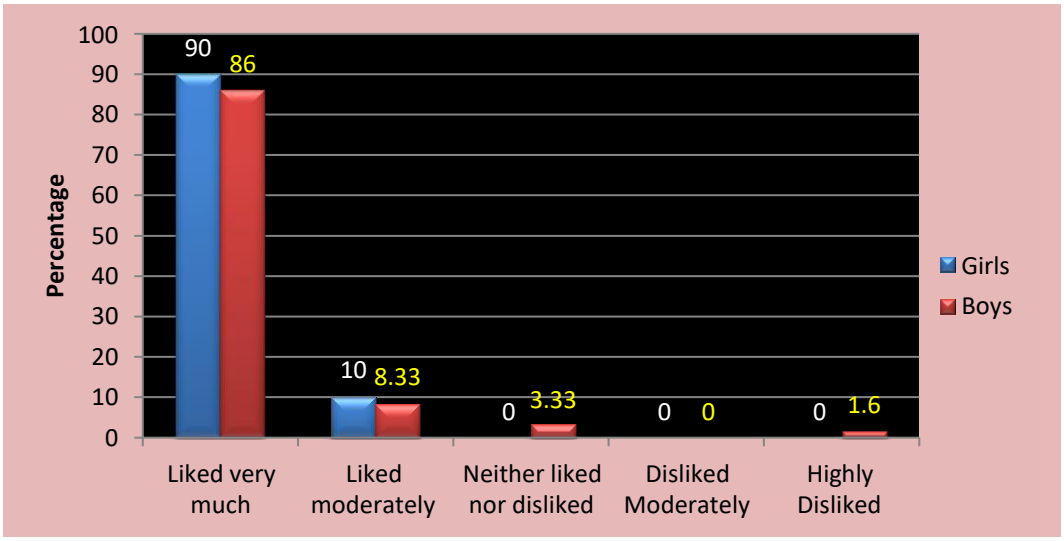


Figure 4.9 Distribution of respondents according to their taste preference between girls and boys

Table 4.13 Distribution of respondents according to their taste preference

a. Preference	**F (N=120)**		**%**	
	Girls	**Boys**	**Girls**	**Boys**
Rice	40	31	66.66	51.66
Millets	20	29	33.33	48.33
Wheat	-	-	-	-
Total	60	60	100.00	100.00
b. **Preferred for meals**				
Yes	26	19	43.33	31.66
No	34	41	56.60	68.33
Total	60	60	100.00	100.00

It was evident from Table 4.13, 66.66 per cent of the girls preferred mostly rice as healthy food followed by nearly 33.33 per cent preferred millets. About by 51.66 per cent of the boys preferred rice as the preference of health followed by millets (48.33%). none of the respondents form girls or boys preferred wheat as healthy food. Preference towards millet products for meal pattern was stated that 43.33 per cent of the girls and only 31.66 per cent of the boys preferred millets for meal pattern.

Table 4.14 Distribution of respondents according to the perception on future demand regarding millet biscuits

Statement pertaining to the parameters showed perception on future demand regarding millet biscuits which was assessed mainly to understand the demand for biscuits. Different parameters were included according to the review of literature. The parameters mentioned were basically under two headings i.e**.** reasons for increasing demand and reasons for decreasing demand.

Table 4.14, refers to the reasons for increasing and decreasing the demand in future. Respondents were asked to report on a 3 point continuum scale i.e. yes (2), no (1) and no idea (0). Each point on the scale carried a score. These score values were not printed on the instrument but they are shown here just to indicate the scoring pattern.

Parameters	(2) Yes	(1) No	(0) No Idea	Total score	Mean	Rank
a. Reason for increasing demand						
Healthy	62	13	45	137	1.14	1
Cheap	51	24	45	126	1.05	3
Availability	60	15	45	135	1.12	2
b. Reason for decreasing demand						
Family size	32	10	78	74	0.61	2
Expensive	34	8	78	76	0.63	1
Taste	24	18	78	66	0.50	3

Each statement was scored by 120 respondents on a 3 point scale. The maximum score earned on that statement was 120x2=240 i.e. yes and minimum score earned on each statement was 120x0=0 i.e. no idea.

Hence, score on each statement would fall between 240 and 0. Ranking was given to each statement based on the total score of that statement. The total score was calculated on each statement separately by multiplying the score with the number of responses on all three categories and added up. If the score happens to be 240, it shows that all respondents were accepting the statement provided. Score of zero would mean

respondents had no idea on the statement. All the respondents' answers were scored totaled and thus ranking was given based on the total score earned on each statement.

The results revealed that foremost reason for increasing demand in future was healthy aspect of millets (1st rank) followed by availability (2nd rank) and cheap (3rd rank). The main reason for decreasing demand was being expensive (1st rank), family size (2nd rank) and taste (3rd rank).

4.6 Various Attributes regarding millet biscuits

This section deals with the various attributes of millet biscuits like appearance, taste, texture, nutritious and smell.

Table 4.15 Distribution of respondents according to the attributes regarding millet biscuits

Attributes	5 (LV)	4 (LM)	3 (ND)	2 (DM)	1 (HD)	Total score	Mean	Rank
Appearance	-	7	109	3	1	362	3.01	3
Taste	106	11	2	-	1	581	4.84	1
Texture	-	1	2	83	34	210	1.75	4
Nutritious	13	100	5	1	1	483	4.02	2
Smell	1	1	2	33	83	164	1.36	5

Table 4.15 refers to the attributes regarding millet biscuits that lead to consumer satisfaction. Respondents were asked to report on a 5 point continuum scale i.e. liked very much (5), liked moderately (4), neither liked nor disliked (3), disliked moderately (2) and highly disliked (1). Each point on the scale carried a score. These score values were not printed on the instrument but they are shown here just to indicate the scoring pattern. Each statement was scored by 120 respondents on a 5 point scale. The maximum score earned on that statement was 120x5=600 i.e. liked very much and minimum score earned on each statement was 120x1=120 i.e. highly disliked.

Hence, score on each attribute would fall between 600 and 120. Ranking was given to each statement based on the total score of that statement. The total score was calculated on each statement separately by multiplying the score with the number of

responses on all 5 categories and added up. If the score happens to be 600, it shows that the attribute provided was liked very much by all respondents. Score of 120 would mean respondents had highly disliked on that attribute.

Each statement's mean score was also calculated by dividing the total score with 120 respondents. The same method was followed for each statement thus, for all the 5 statements mean was calculated (Figure 4.9).

All the respondents' scores were totaled and thus ranking was given based on the total score earned on each attribute. The results revealed that taste factor was ranked high (1st rank) in giving satisfaction to the user followed by nutritious factor (2nd rank), appearance (3rd rank), texture (4th rank) and least acceptable factor was smell (5th rank). While Ballolli *et al* (2001) had stated in their study that barnyard millet cookies were highly acceptable with light and crisp texture, pleasant aroma and excellent taste.

Mathew *et al*. (2017) had also conducted a similar study on sensory attributes of millet biscuits and found out that products prepared by 25 per cent of refined proso millet and 75 per cent refined corn flour were accepted with their taste, flavor and texture.

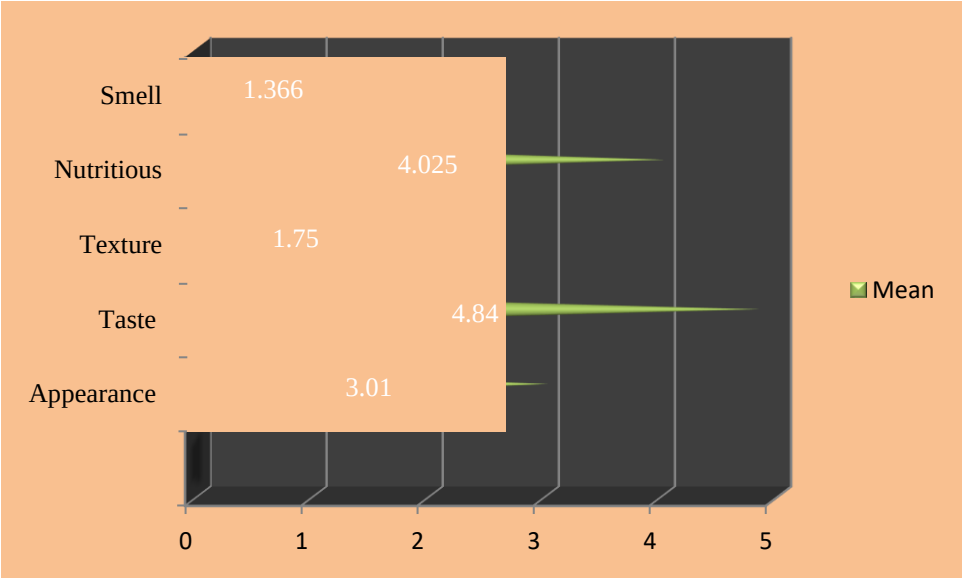


Figure 4.10 Distribution of the respondents according to the attributes regarding millet biscuits by using mean score

4. 7 Nutritional benefits on consuming millet biscuits

Well-balanced diet, fine nutrition and individuals physical activity helps to maintain a healthy weight and adds energy. To stay strong and healthy body requires nutrients for growth and repair of cells. This section provides information regarding the nutritional benefits of millet biscuits. The four main factors that contribute nutritional aspects were noticed health benefits, experienced nutritional benefits, noticed health problems and experienced health problems. Under experienced nutritional benefits six different factors included were it regulates blood glucose levels, helps in weight loss, good for heart, highly nutritious, controls diabetes and improves immunity. Under experienced health problems four statements included i.e. indigestion, no appetite, high fiber content and no problems faced.

Table 4.16 Distribution of respondents according to the nutritional benefits on consuming millet biscuits

a. Noticed any health benefits	**F (N=120)**	**%**
Yes	19	15.83
No	101	84.16
Total	120	100.00
***b. Experienced nutritional benefits**		
Regulate blood glucose levels	22	18.30
Helps in weight loss	103	85.80
Good for heart	93	77.50
Highly nutritious	103	85.80
Controls Diabetes	110	91.60
Improves Immunity	109	90.80
c. Noticed any health problems		
Yes	5	4.16
No	115	95.83
Total	120	100.00
d. Experienced health problems		
Indigestion	2	1.60
No appetite	2	1.60

High fiber content	1	0.83
No problems faced	115	95.83
Total	120	100.00

*Total exceeds cent percent due to multiple responses

Table 4.16 revealed the respondents' opinion on nutritional aspects regarding millet biscuits. Most of the respondents (84.16%) have not faced any health benefits and 95.83 per cent of the respondents have not faced any health problems.

Nutritional benefits experienced by consuming millet biscuits by majority of the respondents were control of diabetes (91.6%) and improving immunity (90.8%). Other benefits encountered equal priority for the statements as millet biscuits were highly nutritious and helps in weight loss (85.8%), followed by good for heart (77.5%) and very negligible proportion (18.3%) felt that they regulate blood glucose levels.

Consuming millet biscuits could have caused some health related problems. About 95.83 per cent of the respondents have not faced any health problems, followed by indigestion and no appetite with equal priority (1.6%). Very minute proportion (0.83%) felt that they have high fiber content.

The results were supported by Glew *et al* (2008) that finger millet consumption improves immune function, reduces risk of heart disease and increases blood circulation.

4.8 Satisfaction level in relation to millet biscuits

This section deals with the factors for satisfaction level regarding millet biscuits. The foremost factors that contribute to satisfaction were taste satisfaction, packaging factor, preference for meals, promote others to eat millets, any constraints faced in supply and impact of any promotional activity. Under packaging factor three options were included i.e. poor, good and average. Poor transport facility, broken biscuits and no constraints at all were the three different statements mentioned under the factor i.e. constraints in supply of the millet biscuits.

Table 4.17 Distribution of respondents according to the factors for level of satisfaction in relation to millet biscuit

c. Taste satisfaction	**F(N=120)**	**%**
Yes	114	95.00
No	6	5.00
Total	120	100.00
d. Packaging factor		
Poor	2	1.66
Good	19	15.83
Average	99	82.50
Total	120	100.00
e. Promote others to eat		
Yes	116	96.60
No	4	3.33
Total	120	100.00
f. Any Constraints in supply		
Poor transport facility	2	1.62
Broken biscuits	5	4.18
No constraints	113	94.10
Total	120	100.00
g. Impact of promotional activity		
Yes	12	10.00
No	108	90.00
Total	120	100.00

Consumer satisfaction with the taste was maximum i.e. 95 per cent expressed as shown in table 4.17. Regarding the packaging factor, mostly (82.5%) quoted as average to some extent (15.83%) as good packaging and the tiny proportion (1.66%) expressed as poor packaging.

From table 4.17 it was a confirmation that 37.5 per cent of the respondent's preference for millets as meal pattern was low. Above half of the respondents (62.5%) have not preferred at all.

On the whole, 96.6 per cent of the respondents were promoting others to eat millet biscuits whereas only few (3.33%) respondents were not promoting others. Under the constraints in supply of the millet biscuits the table 4.17 showed that 94.1 per cent of the respondents were not facing any constraints, 4.18 per cent expressed that few biscuits were broken in transport and only 1.62 per cent opined that poor transport

facility was also one of the constraints. It was evident that 90 per cent of the respondents said that there was no impact of promotional activity on their buying behavior**.**

While Sulthana (2014) had reported in their study that majority of the respondents have perceived that consumer have agreed jowar based food products were healthy and good for adults, children and elderly people.

4.9 Reasons for satisfaction about millet biscuits

The current section deals with the findings and discussions regarding the reasons for satisfaction about millet biscuits i.e. they provide wholesome nutrition, restricted to old and ill members of the family, millet foods are perfectly blend to the modernity and health, easy to digest, they give high amount of energy, tasty foods, only few consumers were aware of benefits, low availability and it requires more effort to cook.

Table 4.18 Distribution of respondents according to the reasons for satisfaction

Reasons	yes (2)	No (1)	No Idea (0)	Total score	Mean	Rank
Millets biscuits provide wholesome nutrition	40	5	75	85	0.70	7
Millet based foods should be restricted to old & ill members of the family	6	37	77	49	0.40	9
Millet based foods are perfect blend modernity & health	24	62	34	110	0.91	6
Millet based foods are good and easy to digest	88	28	4	204	1.70	2
Millet based foods give high amount of energy for daily work	60	14	46	134	1.11	5
Millet products are tasty	108	12	-	228	1.90	1
Only few consumers were aware of Millet benefits	71	28	21	170	1.41	3
Availability of Millet products is low	70	24	26	164	1.36	4
Cooking Millets requires more effort	18	24	78	60	0.50	8

Table 4.18 refers to the reasons for satisfaction regarding millets. Respondents were asked to report on a 3 point continuum scale i.e. yes (2), no (1) and no idea (0). Each point on the scale carried a score. These score values were not printed on the instrument but they are shown here just to indicate the scoring pattern. Each statement was scored by 120 respondents on a 3 point scale. The maximum score earned on that statement was 120x2=240 i.e. yes and minimum score earned on each statement was 120x0=0 i.e.no idea.

Hence, score on each statement would fall between 240 and 0. Ranking was given to each statement based on the total score of that statement. The total score was calculated on each statement separately by multiplying the score with the number of responses on all 3 categories and summed up. If the score happens to be 240, it shows that all respondents were accepting the statement provided. Score of zero would mean respondents had no idea on that statement. All the respondents' answers were scored totaled and thus ranking was given based on the total score earned on each statement.

Each statement's mean score was also calculated by dividing the total score with 120 respondents. The same method was followed for each statement thus, for all the 9 statements mean was calculated.

The results revealed that foremost reason for satisfaction was that the products were tasty followed by the factor "easy to digest" (2^{nd} rank) and only few consumers were aware of millet benefits (3^{rd} rank). The least (9^{th} rank) reason was that the millet based foods were restricted to old and ill members of the family.

The results were supported by Kalidas and Mahendran (2017) that majority of the respondents (81.33%) were satisfied, followed by highly satisfied (9%), neutral (6.67%) and very negligible (2.67%) dissatisfied.

4.10 Hypothesis testing between independent variables and dependent variables

4.10.1 Correlation between independent variables and dependent variable i.e. Awareness level of the students

In order to study the relationship between the independent variables and awareness level of the students, correlation coefficient, 'r' values were computed and values were presented in the table 4.19.

Alternate hypothesis: There will be a significant relationship between the profile characteristics of students i.e. age, education, gender and awareness level of the students.

Table 4.19 Correlation analysis of independent variables with dependent variable - Awareness level of the students

Independent variables	**'r' value - Awareness level of the students**
Age	0.16 NS
Education	0.16 NS
Gender	0.03NS

NS = Non- significant

From the table 4.19 it could be observed that the coefficient of correlation of awareness level of the students with the age and education was found to be r = **0.16 NS,** which was less than the table value of "r" (0.172). Hence the alternate hypothesis was rejected. Therefore, it could be inferred that there was no significant relationship between the age, education and awareness level of the students regarding millets. The above values gave clear indication that awareness level was not depending on age and education of the students. Though increase in age and education there awareness level might increase or decrease, depends on sources of information available to the students.

From table 4.19, it could be observed that the coefficient of correlation of awareness level of the students with the gender was found to be r = **0.03 NS,** which was less than the table value of "r" (0.172). Proving that alternate hypothesis was rejected. Therefore, it could be inferred that there was no significant relationship between the gender and awareness level of the students regarding millets. The above value was evidence that awareness level was not depending on gender of the students. The reason might be perhaps these millet biscuits were distributed in the schools, so they had no awareness from outside except consuming in the school.

4.10.2 Correlation between independent variables and dependent variable i.e. Acceptance level of the students

To facilitate the relationship between independent variables and acceptance

level of the students, correlation coefficient, "r" values were computed and values were presented in the table 4.20.

The relationship between the scores of independent variables and acceptance level of the students was tested by alternate hypothesis.

Alternate hypothesis: There will be a significant relationship between the profile characteristics of students i.e. age, education, gender and acceptance level of the students.

Table 4.20 Correlation analysis of independent variables with dependent variable i.e. Acceptance level of students

Independent variables	**'r' value - Acceptance level of the students**
Age	0.21 S*
Education	0.21 S*
Gender	-0.16 NS

S* = Significant at 0.05 level of probability

NS = Non- significant

It was evident from table 4.20 that coefficient of correlation of acceptance level of the students with the age and education was found to be r = **0.21 S*,** which was more than the table value of "r" (0.172) at 5% level of significance. Hence the alternate hypothesis was accepted. Therefore, it can be concluded that there was a negative and significant relationship between the age, education and acceptance level of the students regarding millets. Perhaps due to increase in age and education, increases the increase in exposure might occur and knew about healthy food items, due to which millet acceptance increases.

From table 4.20 it could be observed that the coefficient of correlation of acceptance level of the students with the gender was found to be r = **-0.16 NS,** which was less than the table value of "r" (0.172). Proving that alternate hypothesis was rejected. Hence, there was no significant relationship between the gender and acceptance level of the students regarding millets. Thus acceptance level was not

depending on gender of the student. It might be due to the supply of millet biscuits by school was done equally for the genders.

4.10.3 Correlation between independent variables and dependent variable i.e. Taste preference of the students.

To assess the relationship between independent variables and taste preference of the students, correlation coefficient, 'r' values were computed, presented in the table 4.21.

The relationship between the independent variables and taste preference of the students was tested by alternate hypothesis.

Alternate hypothesis: There will be a significant relationship between the profile characteristics of students i.e. age, education, gender and taste preference of the students.

Table 4.21 Correlation analysis of independent variables with dependent variable i.e. Taste preference of students

Independent variables	'r' value - Taste preference of the students
Age	0.13 NS
Education	0.13 NS
Gender	0.05 NS

NS = Non- significant

From the table 4.21, it could be observed that the coefficient of correlation of taste preference of the students with the age and education was found to be r = **0.13 NS,** which was less than the table value of "r" (0.172). Hence the alternate hypothesis was rejected. Therefore, it could be inferred that there was no significant relationship between the age, education and taste preference of the students regarding millets. The above values gave clear indication that taste preference was not depending on age and education of the students. Taste preference might vary for each respondent based on individuals' perception.

From the table 4.21, it could be observed that the coefficient of correlation of taste preference of the students with the gender was found to be r = **0.05 NS,** which was less than the table value of "r" (0.172). Proving that alternate hypothesis was rejected.

Therefore, it could be inferred that there was no significant relationship between the gender and taste preference of the students regarding millets. It implies that taste preference was not depending on gender of the students.

4.10.4 Correlation between independent variables and dependent variable i.e. Perception on nutritional benefits regarding millet biscuits.

To study the relationship between independent variables and perception on nutritional benefits regarding millet biscuits, correlation coefficient, 'r' values were computed presented in the table 4.22.

The relationship between the scores of independent variables and nutritional benefits regarding millet biscuits was tested by alternate hypothesis.

Alternate hypothesis: There will be a significant relationship between the profile characteristics of students i.e. age, education, gender and perception scores of nutritional benefits regarding millet biscuits.

Table 4.22 Correlation analysis of independent variables with dependent variable i.e. perception on nutritional benefits regarding millet biscuits

Independent variables	'r' value - Nutritional benefits regarding millet biscuits
Age	0.15 NS
Education	0.15 NS
Gender	0.11 NS

NS = Non- significant

From the table 4.22 it could be observed that the coefficient of correlation of perception on nutritional benefits regarding millet biscuits with the age and education was found to be r = **0.15 NS,** which was less than the table value of "r" (0.172). Hence the alternate hypothesis was rejected. Therefore, it could be inferred that there was no significant relationship between the age, education and nutritional benefits regarding millet biscuits. The above values gave clear indication that nutritional benefits were not depending on age and education of the students.

From the table 4.22 it could be observed that the coefficient of correlation of perception on nutritional benefits with the gender was found to be r = **0.11 NS,** which was less than the table value of "r" (0.172). Proving that alternate hypothesis was rejected. Therefore, it could be inferred that there was no significant relationship between the gender and perception on nutritional benefits regarding millet biscuits. The above value proved that nutritional benefits were not depending on gender. It might be due to the fact that since they were consuming millet biscuits as provided by the school, hence perception was the same for all.

4.10.5 Correlation between independent variables and dependent variable *i.e.*, student's satisfaction level regarding millet biscuits.

In order to study the relationship between the independent variables and satisfaction level of the students regarding millet biscuits, correlation coefficient, 'r' values were computed presented in the table 4.23.

The relationship between the age of students and satisfaction level of the students was tested by alternate hypothesis.

Alternate hypothesis: There will be a significant relationship between the profile characteristics of students i.e. age, education, gender and scores of satisfaction level of the students.

Table 4.23 Correlation analysis of independent variables with dependent variable i.e. Satisfaction level of students

Independent variables	'r' value - Satisfaction level of the students
Age	0.10 NS
Education	0.10 NS
Gender	-0.02 NS

NS = Non- significant

From the table 4.23, it could be observed that the coefficient of correlation of satisfaction level of the students with the age and education was found to be r = **0.10 NS,** which was less than the table value of "r" (0.172). Hence the alternate hypothesis was rejected. Therefore, it could be inferred that there was no significant relationship between the age, education and satisfaction level of the students regarding millet

biscuits. The above values gave clear indication that satisfaction level was not depending on age and education of the students. It might be due to the free supply of millet biscuits in the school and the consumption of them is mandatory due to which they didn't perceive the satisfaction or they do not have clear preferences for the millet based products.

From the table 4.23 it could be observed that the coefficient of correlation of satisfaction level of the students with the gender was found to be r = **-0.02 NS,** which was less than the table value of "r" (0.172). Proving that alternate hypothesis was rejected. Therefore, no significant relationship between the gender and satisfaction level of the students regarding millets biscuits. In other words it is evident that satisfaction level was not depending on gender of the student.

4.10.6 Correlation between independent variables and dependent variable i.e. Consumption level of students regarding millet biscuits

In order to study the relationship between the independent variables and consumption level of the students regarding millet biscuits, correlation coefficient, 'r' values were computed presented in the table 4.24.

The relationship between the age of students and consumption level of the students was tested by alternate hypothesis.

Alternate hypothesis: There will be a significant relationship between the profile characteristics of students i.e. age, education, gender and scores of consumption level of the students regarding millet biscuits.

Table 4.24 Correlation analysis of independent variables with dependent variable i.e. Consumption level of students regarding millet biscuits

Independent variables	**'r' value – Consumption level of the students**
Age	0.11 NS
Education	0.11 NS
Gender	0.06 NS

NS = Non- significant

From the table 4.24 it could be observed that the coefficient of correlation of consumption level of the students with the age and education was found to be r = **0.11 NS,** which was less than the table value of "r" (0.172). Hence the alternate hypothesis was rejected. Therefore, it could be inferred that there was no significant relationship between the age, education and consumption level of the students regarding millet biscuits. The above values gave clear indication that consumption level was not depending on age and education of the students. Low availability is also a leading reason for consumption level. Through age and education they might had knowledge on millet benefits, but due to their taste preference consumption level may increase or decrease.

From the table 4.24 it could be observed that the coefficient of correlation of consumption level of the students with the gender was found to be r = **0.06 NS,** which was less than the table value of "r" (0.172). Proving that alternate hypothesis was rejected. Therefore, it could be expressed that there was no significant relationship between the gender and consumption level of the students regarding millets biscuits. In other words it is evident that consumption level was not depending on gender of the student. Based on their own taste preferences, the consumption level may increase or decrease among girls and boys.

Chapter V

SUMMARY AND CONCLUSIONS

Food consumption and production have a considerable impact on the environment. Millets being abundant and widespread in its availability also provide wholesome nutrition. Now-a-days the consumer demand for food is an important factor in formulation of various new processing methods. Nutrition and health issues appear to be major concerns about the nutritional content of foods. Consumers are looking for various foods that offer more health benefits. In order to give the consumers better products, consumer preferences are to be understood. This will be helpful for the entrepreneurs, marketers and researchers to make their products better and improved which will satisfy their consumers (Srinivasulu, 2011). Being a student of PJTSAU, it is essential to look at the acceptance and satisfaction level regarding millet biscuits supplied by PJTSAU, among students. Thus the present research topic "**EVALUATIVE STUDY ON CONSUMER ACCEPTANCE AND SATISFACTION REGARDING THE MILLET BISCUITS AMONG CHILDREN IN SOCIAL WELFARE SCHOOLS (TSWREIS)**" has proposed with the following objectives:

1. To study the consumer awareness among school children regarding – benefits of millet biscuits.
2. To analyze the consumer acceptance of millet biscuits, manufactured and supplied by "PJTSAU" in the study area.
3. To assess the taste preferences between girls and boys regarding millet biscuits.
4. To study the consumer level of satisfaction of millet biscuits.

Exploratory research design was adopted to conduct the study. Multistage sampling technique was used and total four schools were purposively selected for the study. The list of schools that were supplied millet biscuits as snacks for students in Hyderabad and Nagarkurnool districts were collected through Millet Processing and Incubation Centre (PJTSAU). Among two districts from the list, four schools were selected from urban and rural regions. A total of one hundred and twenty students i.e.

from Shaikpet -30, Mahendrahills -30, Achampet -30 and Mannanur -30 were selected in Hyderabad and Nagarkurnool districts to study the consumer acceptance and satisfaction of millet biscuits in TSWREIS. The data was collected from the respondents by using the structured interview schedule. Statistical procedures like frequency, percentage and correlation tests were conducted to analyze and interpret the collected data.

Salient findings

The following observations were made in the research.

Profile and general information of the students

- On the whole 47.5 per cent of the respondents belonged to upper lower class followed by lower middle (45%), upper middle (5%) and very minor i.e. 2.5 per cent families were from lower class and none of them from Upper class.
- The equal proportion of the respondents (50%) belonged to 12-15 years and 16-19 years.
- Equal percentage (50%) of the respondents belonged to secondary school education and junior college.
- Out of the total respondents, each fifty per cent were male and female respondents.
- More than half of the respondents (56.70%) belonged to nuclear families followed by 43.40 per cent of the respondent's belonged to joint families.
- An equal proportion of the respondents (50%) belonged to urban area and the other half (50%) was chosen from rural area.

General awareness regarding millet products

- cent percent of respondents were aware of millet biscuits followed by roti (90.8%), flour (87.5%), laddu (86.6%), muruku (73.3%), rawa (19.16%), rusk (16.6%), cookies (15%), flakes and ragi bites (11.6%), muffins (10.8%), vermicelli (7.5%), millet smoothix (4.16%) while negligible proportion knew about cakes (3.33%).

- Majority (89%) perceived that millets were good for diabetes, as they had high fiber content (85.8%), rich in minerals and vitamins (84.1%), had high protein content (35.83%), it lowers high blood pressure (15%) and gluten free and non allergic (5.8%).
- Maximum respondents (91.6%) got information about millet biscuits from school/hostel, 57.5 per cent from family, 15 per cent from neighbors / friends, 11.6 per cent from exhibitions and only 8 per cent through publicity in T.V and newspaper.

Consumption pattern regarding millet biscuits

- More than half (60%) of the respondents consumed millet biscuits for 1 to 3 years and 38.3 per cent of the respondents consumed for 3 to 6 years followed by consumption below 1 year was by very minor proportion i.e. 1.6 per cent. Period of consumption above six years was nil as supply of millet biscuits was delayed from 2020 due to covid pandemic.
- Maximum (95.83%) preference about meal pattern for millet consumption was snacks and only few (4.16%) preferred millets as breakfast item. None of the respondents preferred millet products in their dinner.
- On the whole, 80.8 per cent of the respondents were consuming millet biscuits weekly once and little more than one-tenth (14.16%) were consuming monthly once. Further analysis showed that only few (5%) of the respondents was consuming millet biscuits weekly twice. None of the respondents were consuming daily.
- Among all the respondents 85.8 per cent of the respondents were consuming less than five biscuits per day and only 14.16 per cent were consuming nearly 5-10 biscuits per day
- About 83.3 per cent were facing non availability as main constraint and 80.83 per cent of the respondents were facing limited recipes as one of the constraint, 12.5 per cent of the respondents felt that non acceptability by children was also a constraint. Very few (8.3%) of them state that millet biscuits were expensive and a negligible proportion (5%) of the respondents expressed that poor taste as a constraint in consuming millet biscuits.

Factors influencing the acceptance of millet biscuits

- Good taste was the factor that ranked as high (1st rank) for acceptance of millet biscuits by the respondents. The most significant factor for consuming millet biscuits by influence of neighbors and friends (2nd rank), health benefits (3rd rank). The least important factor for consuming millet biscuits quoted was consumption as per doctor suggestion.
- Level of acceptance regarding millet biscuits revealed that 62.50 per cent of the respondents were expressed average followed by 25 per cent had high acceptance and very few (12.5%) had low level acceptance.

Taste preference between girls and boys regarding millet biscuits

- Majority (90%) of the girls liked very much and only ten per cent of the girls had liked moderately. About eighty six per cent of the boys liked very much followed by liked moderately (8.33%), neither liked nor disliked (3.33%) and only negligible per cent (1.6%) highly disliked.
- It can be concluded that both, girls and boys were preferred millet biscuits, comparatively girls preferred more than boys.
- Nearly 66.66 per cent of the girls preferred mostly rice as healthy food followed by nearly 33.33 per cent preferred millets. About by 51.66 per cent of the boys preferred rice as the preference of health followed by millets (48.33%).
- Preference towards millet products for meal pattern was stated that 43.33 per cent of the girls and only 31.66 per cent of the boys preferred millets for meal pattern.

Various Attributes regarding millet biscuits

- The foremost reason for increasing the demand in future was healthy aspect of millets (1st rank) followed by availability (2nd rank) and cheap (3rd rank). The main reason for decreasing demand was being expensive (1st rank), family size (2nd rank) and taste (3rd rank).
- Taste factor was ranked high (1st rank) in giving satisfaction to the user followed by nutritious factor (2nd rank), appearance (3rd rank), texture (4th rank) and least acceptable factor was smell (5th rank).

Perception on nutritional benefits on consuming millet biscuits

- On the consumption of millet biscuits majority of the respondents (84.16%) had felt healthy. Most of the respondents felt that millets control diabetes (91.6%) and improve immunity (90.8%). Other benefits encountered equal priority for the statements as millet biscuits were highly nutritious and helps in weight loss (85.8%), followed by good for heart (77.5%) and very negligible proportion (18.3%) felt that they regulate blood glucose levels.

- About 95.83 per cent of the respondents had leading a healthy life, followed by indigestion and no appetite with equal priority (1.6%). Very minute proportion (0.83%) felt that they have high fiber content.

Satisfaction level in relation to millet biscuits

- About 95 per cent expressed high satisfaction with the taste. Regarding the packaging factor, mostly (82.5%) quoted as average to some extent (15.83%) as good packaging and the tiny proportion (1.66%) expressed as poor packaging.
- Out of all the respondents 37.5 per cent of the respondent's preference for millets as meal pattern was low. Above half of the respondents (62.5%) have not preferred at all.
- On the whole, 96.6 per cent of the respondents were promoting others to eat millet biscuits whereas only few (3.33%) respondents were not promoting others.
- Majority of the respondents (94.1%) were not facing any constraints, 4.18 percent expressed that few biscuits were broken in transport and only 1.62 per cent opined that poor transport facility was also one of the constraints.
- About 90 per cent of the respondents said that there was no impact of promotional activity on their buying behavior**.**

Reasons for satisfaction about millet biscuits

- The Foremost reason for satisfaction was that the products were tasty followed by the factor "easy to digest" (2^{nd} rank) and only few consumers were aware of

millet benefits (3rd rank). The least (9th rank) reason was that the millet based foods were restricted to old and ill members of the family.

Relation between independent and dependent variables

- There was no significant relationship between the age, education and awareness level. Though increase in age and education there awareness level might increase or decrease, depends on sources of information available to the students.
- There was no significant relationship between the gender and awareness level of the students regarding millets. The reason might be perhaps these millet biscuits were distributed in the schools, so they had no awareness from outside except consuming in the school.
- There was a negative significant relationship between the age, education and acceptance level of the students regarding millets biscuits. Perhaps due to increase in age and education, increases the increase in exposure might occur and knew about healthy food items, due to which millet acceptance increases.
- There was no significant relationship between the gender and acceptance level. It might be due to the supply of millet biscuits by school was done equally for the genders.
- There was no significant relationship between the age, education, gender and taste preference. Taste preference might vary for each respondent based on individuals' perception.
- No significant relationship between the age, education, gender and nutritional benefits. Since they were consuming millet biscuits as provided by the school, hence perception was the same for all.
- No significant relationship between the age, education, gender and satisfaction level. It might be due to the free supply of millet biscuits in the school and the consumption of them is mandatory due to which they didn't perceive the satisfaction or they do not have clear preferences for the millet based products.
- No significant relationship between the age, education and consumption level. Through age and education they might had knowledge on millet benefits, but due to their taste preference consumption level may increase

or decrease.

- No significant relationship between the gender and consumption level of the students regarding millets biscuits. Based on their own perception on nutritional benefits, the consumption level may increase or decrease among girls and boys.

Areas of future research

The results of the present study demand the need of further investigations in other directions. The following suggestions could be used by the future researchers who were willing to take the similar studies.

- The present study had limitations of time and resources of a single investigator hence small sample of 120 respondents was studied. A comprehensive study with a large sample on the same topic in different region may be conducted in future.
- Future study can be conducted on comparison of consumer acceptance of millet biscuits verses general maida biscuits.
- A study can be conducted on particular brand preference of millets products by the consumers.

Implications of the study

- Supply of Millet biscuits not only to TSWREIS, but also for all the government and private schools would improve consumption and consumer acceptance.
- The study also implies that financial factor also motivates the people in habituating the consumption of millet products.
- If there is more production supply of millet biscuits to the students could be done twice in a week instead of once to increase their consumption level.
- Only millet biscuits were supplied to students but along with that supply of other millet products like instant noodles, cookies, vermicelli etc. might give more satisfaction level regarding millets.
- More awareness campaigns need to be conducted to promote the consumption of millet biscuits/products from school level itself.

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APPENDIX – A

INTERVIEW SCHEDULE

EVALUATIVE STUDY ON CONSUMER ACCEPTANCE AND SATISFACTION REGARDING THE MILLET BISCUITS AMONG CHILDREN IN SOCIAL WELFARE SCHOOLS (TSWREIS)

Date: Schedule No:

1) Name of the Respondent:
2) Address:
3) Contact number:
4) Religion: Hindu / Muslim / Christian / Others
5) Caste: General / SC / ST / OBC
6) Gender – Male /Female:
7) Age:
8) Education:
9) Type of family: Nuclear/ Joint
10) Family size (No.): Men: Women: Children:
11) Socio economic status of the family:

S.No	Parameters	Tick
1	**Education of Head of the Family**	
	Profession or Honors	
	Graduate or Postgraduate	
	Intermediate or Post High School Diploma	
	High School Certificate	
	Middle School Certificate	
	Primary School Certificate	
	Illiterate	
2	**Occupation of Head of Family**	
	Profession	
	Semi-profession	
	Clerical, Shop-Owner	
	Skilled worker	
	Semi-skilled worker	
	Unskilled worker	
	Unemployed	
3	**Monthly Income of Family**	
	<20000	
	20000-50000	
	50000-100000	
	>100000	

12) Are you aware of Millets and Millet biscuits?
    a) Yes

b) No

13) Do you have knowledge about availability of millet biscuits and millet based products in the market?

a) Yes
b) No

14) If yes, What are the different Millet products in market you are aware of..

S.No	Ready to Eat & Ready to Cook	Tick
1	Rusk	
2	Cakes	
3	Biscuits	
4	Cookies	
5	Muffins	
6	Laddu	
7	Flour	
8	Roti	
9	Muruku	
10	Vermicelli	
11	Rawa	
12	Millet flakes	
13	Ragi bites	
14	Millet smoothix	

15) Are you aware of benefits regarding Millet biscuits?

a) Yes
b) No

16) Are you aware of Health Benefits of the Millet products?

S.No	Benefit	Yes	No
1.	High protein content		
2.	Lowers high blood pressure		
3.	Good for Diabetics		
4.	More fiber content		
5.	Gluten free and non allergic		
6.	Rich in minerals vitamins		

17) How did you come to know about benefits of Millet? (Tick)

S.no	Source	Tick
1.	Family	
2.	Neighbours /Friends	
3.	Exhibitions	
4.	Publicity In T.V &Newspaper	
5.	Any Other (school/hostel)	

18) Since how many years millet biscuits are consumed by you.

a) <1 year
b) 1-3 years
c) 3-6 years
d) >6 years

19) According to your perception which one of the following is good for health?

a) Rice
b) Millets
c) Wheat

20) What time of the day you prefer consumption of millet biscuits?

a) Breakfast
b) Snacks
c) Dinner

21) Have you noticed any health benefits that occurred to you personally on consumption of Millet Biscuits?

a) Yes
b) No

22)If Yes, mention the benefits of consuming millet biscuits?

S.No.	Benefits	Tick
1	Regulate blood glucose levels	
2	Helps in weight loss	
3	Good for heart	
4	Highly nutritious	
5	Controls Diabetes	
6	Improves Immunity	

23) How frequently you consume millet biscuits?

a) Daily once
b) Weekly twice
c) Once in a week
d) Once in a month

24) Daily Consumption of Millet biscuits by you?

a) Once per day
b) Twice per day
c) Not preferred

25) No. of Millet biscuits Consumed by you per day?

a) 5-10 biscuits
b) <5 biscuits
c) >10 biscuits
d) Not preferred

26) Mention the constraints faced in Consuming Millet biscuits

S.No.	Constraints	Tick
1	Expensive	
2	Non availability	
3	No awareness	
4	Non acceptability by children	
5	Limited recipes	
6	Poor Taste	

27) Do you notice any Health problems on Excessive consumption of millet biscuits?

a) Yes
b) No

28) If yes mention the Health problems faced by you?

a) Indigestion
b) No appetite
c) High fiber content
d) No problems faced

29) Factors influencing consumers for the consumption of millet biscuits.

S.No	Reasons	Ranking		
		High priority	Medium priority	Low priority
1.	Health benefits			
2.	Good Taste			
3.	Influence of Neighbours & Friends			
4.	Interest towards innovative products			
5.	part of traditional diet			
6.	Suggested by doctor			
7.	Sellers Promotional activities			
8.	Interest towards new products			

30) Are you satisfied with the taste of millet biscuits?

a) Yes
b) No

31) Give your opinion on various attributes regarding Millet biscuits.
Rating: (5 = Liked very much, 4= Liked moderately, 3=neither liked or nor disliked, 2= Disliked Moderately and 1= Highly Disliked)

S.No.	Attributes	Rating
1.	Appearance	
2.	Taste	
3.	Texture	
4.	Nutritious	
5.	Smell	

32) What is your Preference towards Millet biscuits?
a) Liked very much
b) Liked moderately
c) Neither liked or nor disliked
d) Disliked Moderately
e) Highly Disliked

33) State the Reasons for satisfaction about Millets:

S.No	Statement	Yes	No	No Idea
1	Millets biscuits provide wholesome nutrition			
2	Millet based foods should be restricted to old & ill members of the family			
3	Millet based foods are perfect blend modernity & health			
4	Millet based foods are good and easy to digest			
5	Millet based foods give high amount of energy for daily work			
6	Millet products are tasty			
7	Only few consumers were aware of Millet benefits			
8	Availability of Millet products is low			
9	Cooking Millets requires more effort			

34) Your perception with regard to price of the millets/millet products. (Tick)

S.No	Product	Ranking of price		
		High price	**Reasonable price/Medium price**	**Low price**
1.	Millet Biscuits			
2.	General Maida biscuits			

35) Do you have any idea on future demand for millet biscuits / millet product consumption.(Tick)

Increasing_____ Decreasing_____

S.No	Reason for increasing	Yes	No	Reason for decreasing	Yes	No
1	Healthy			Family size		
2	Cheap			Expensive		
3	Availability			Taste		

36) Any Comments on the Information provided on Millet Biscuits packaging.

a) Poor
b) Good
c) Average

37) Does promotional activity have any impact on your buying behavior?

a) Yes
b) No

38) Do you notice any constraints in supply of the biscuits?

a) Poor transport facility
b) Broken biscuits
c) No Constraints

39) Would you like to encourage Millet based products for meals?

a) Yes
b) No

40) Would you recommend Millet biscuits to your friends and family?

a) Yes
b) No

APPENDIX – B
KUPPUSWAMY REVISED SCALE – 2020

Education of head of family	Score	Occupation of head of family	Score	Total per capita family income per month (as given originally in 1976)	Score
Professional degree	7	Professional	10	2000 and above	12
Graduate	6	Semi profession	6	RS 1000-1999	10
Intermediate/diploma	5	Clerical/shop/farm	5	RS 750–999	6
High school	4	Skilled worker	4	RS 500–749	4
Middle school	3	Semiskilled worker	3	300-499	3
Primary school	2	Unskilled worker	2	RS 101–299	2
Illiterate	1	Unemployed	1	Less than RS 100	1

Total score	Socioeconomic class
26–29	Upper class
16–25	Upper middle
11–15	Lower middle
5–10	Upper lower
Below 5	Lower