Assessment of Diet and Sleep Quality of Teachers age 30-50 year

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ABSTRACT

Background: Quality of sleep and dietary intake effects health of an individual. Poor sleep quality could be associated with poor diet. Therefore we assessed the diet quality and sleep quality of teachers belonging to Nagaland, India.

Methods: This is a cross-sectional study design. Data were collected via survey-interview. A total of 157 teachers data were collected in the North East, India. Food frequency questionnaires were used to assess their diet quality and the Pittsburgh Sleep Quality Index(PSQI) questionnaires were used to assess their sleep.

Results: It was found that there was significant association between gender, food type, and BMI with poor sleep quality. Majority of them had a normal sleep quality but poor diet quality. There was no association found between diet and sleep quality, this may be due to smaller sample size.

Conclusion: Lack of physical activity, poor diet habits and poor sleep contributes to unhealthy lifestyle and wellbeing of an individual. So, people should give more importance to one's own health and wellbeing and live a healthy lifestyle.

Keywords: Dietary pattern, sleep quality, eating habits, food intake.

CHAPTER -1

INTRODUCTION

1. INTRODUCTION

Nagaland is also known as "Land of Festival" with a large number of different tribes and cultural diversity that they bring, with contrast in language, all tribes have a similar dress code, eating habits and traditional laws. Naga cuisines are devoid of spices and are largely based on the foodstuffs they find in their surroundings. The food plate is constantly joined by a bowl of full occasional green vegetables and leaf's it is true that the Naga's have a decent knowledge on what is consumable and nutritious. Naga people have their own cuisines, but often exchanged recipes. A typical Naga meal consists of rice, a meat dish, one boiled vegetable dish and a chutney/pickle(Tathu). Rice is the main carbohydrate source in the Naga diet and this region produces a number of prized rice varieties, but rice is also imported into the region from other states. Dried/smoke meat is a very important ingredient in Naga cuisine and has practical significance for sustenance farmers/foragers and hunters. Smoked meat is often kept for an entire year to provide food security for individual families. Naga's people prefer boiled edible organic leaves and wild forage which makes up a large part of the diet of many Naga regions.

Naga food tends to be spicy and there are several different varieties of chilies in Nagaland. The ginger used in the Naga cuisine is spicy, aromatic and is different from the common ginger. Garlic and ginger leaves are also used in cooking meat dishes.[Naga recipes].

People who had consumption of healthier components had short sleep than those who had unhealthier components, they had longer sleep as well as some healthier components [Jansen C et al., 2020].

1.1 Diet Quality and Health

Diet quality is a key component of the definition of food security. It refers to a diversified, balanced and healthy diet, which provides energy and all essential nutrients for growth and a healthy and active life. With rapidly changing diets and increasing concern for all forms of malnutrition, measuring diet quality, instead of focusing in energy sufficiency or on single nutrients, is of growing relevance. Inadequate intake of high protein and micronutrients is associated with growth retardation, mortality and infections in infants and young children, reduced capacity for learning in children and hence productivity in adults. Tracking individual nutrients is insufficiency for understanding the causes and consequences of poor health and nutrition outcomes and thus there is increasing interest in looking at dietary patterns.[Gerald J et al., 2020]

The impact of what an individual eats on wellbeing outcomes is seldom influenced by any individual consuming event or single food. Instead, health outcomes related to diet are a consequence of complex combinations of foods consumed together over time, which is referred to as dietary quality (DQ). Low DQ, such as not meeting the guidelines for fruits and vegetables consumption or inordinate sugar intake has been associated with increased risk of obesity and other chronic diseases and some cancers. High DQ has been expected to decrease the possibility and a defensive component against persistent sickness such as

cardiovascular disease (CVD), type 2 diabetes mellitus and some cancers. A study found that for each extra serving of fruit and vegetable, the possibility of stroke was reduced by 11% and 3% respectively. Additionally, higher intake of vegetables was related with a 14% diminished hazard of DM and vegetables and berry consumption has been related with numerous chronic diseases outcomes, DQ is a significant result to survey in nourishment wellbeing and constant sickness counteraction exploration and program assessment, however estimating DQ can be a perplexing cycle[[Clin J et al., 2011]. This research includes a survey, including cross-sectional analysis of the dietary intake of individual and groups, their sleeping pattern.

The impact of the intervention aimed at affecting the diet quality of teachers can be difficult to evaluate long-term. Understanding the dietary needs of the population, through assessment of diet quality and sleeping pattern may lead to the development of an effective intervention that will have a measureable positive impact.

The HEI can aggregate the quality of food consumed to produce a total score and set of sub-scores designed to determine the diet quality of a person. The HEI was originally developed on 1995 by the United States Department of Agriculture (USDA) and was used to help evaluate to the current Dietary Guidelines for Americans. Healthy Eating Index is among the leading indices assessing the diet quality to maintain health and improve well-being. It is updated at every five years [Clin J et al., 2020].

The HEI-2005 assesses dietary intakes on for every calorie premise as opposed to based on outright of sums food varieties ate subsequently the HEI-2005 surveys the nature of the general extent of food varieties ate instead of the amount of food sources consumed[Nilufer A et al., 2011]. Diet quality is assessed using several methods, here we used food frequency questionnaire to assess the diet of teachers.

1.2 Sleep Quality and health

Several studies have reported associations between sleep duration and a number of metabolic disturbances [Gerald J et al., 2017]. Inadequate sleep is well-known in present day societies, mean sleep length has reduced in many nations and attention has centered on the institutions of inadequate seep and health results. Associations with insufficient, especially brief sleep period have been pronounced for weight problems and general mortality[Vijay K C et al., 2019]. In the place of business, shift work and excessive work demands have been related to sleep distractions, and those with poor sleep take more leaves or have problems in work related activities. Thus, a decrease in sleep distraction will influence both general and working populations. Although adequate methods of comparing sleep have no longer been rigorously established, Buysse evolved the PSQI to assess general sleep high quality. This questionnaire contains seven components of sleep and their sum yields a global score for sleep quality. A high global score shows bad sleep satisfactory and has been related to metabolic syndrome. Sleep period and exceptional are associated with many illnesses. Assessing the relationship between supplement intake and sleep quality is fundamental, due to the fact nutritional elements play a critical position in sleep quality. Short sleep duration which is related to both, metabolic problems, weight problems, and an abnormal sleep pattern are thought to be associated with unhealthy diet [Nevin S et al., 2020]. The perplexing connection between diet, sleep, and hazard factors for persistent sicknesses becomes

obvious early in life and continues throughout the existence course. [Front N et al., 2017].

1.3 Sleep and food intake

Assessing the association between sleep quality and food consumption is vital due to the fact even as nutritional factors that affect sleep best may be effortlessly progressed, altering sleep quality autonomously cannot. Some life-style behaviors consisting of exercising can also enhance sleep quality.

The chance of metabolic syndrome, type 2 diabetes, CVD mortality and all-motive mortality may increase in modification of sleep length. Few studies shows that people with ordinary modifications of their shift rotations, and for that reason in their sleep styles, have bodily state of being inactive, obese, sleep deprivation, extended cortisol secretion, and higher infection.

Obesity is becoming a widespread globally and the cause of this disease are changes in food consumption, lifestyle, environment, and genetics, and in addition psychological influences and physiological also more recently alterations in sleep patterns [Sarah C et al., 2020]. Some studies have reported associations between sleep duration and a number of metabolic disturbances[Cai Gh et al., 2018]. Compared with people sleeping 6 to fewer than 9hour/night, those with shorter or longer sleep duration have more obesity and central obesity and they also have higher morbidity and mortality rates[Ledger D et al., 2014]. Longitudinal studies have further revealed that both short and long sleepers gain weight as compared to normal sleepers [Theorell-Haglow L et al., 2014]. Few studies also shows that short and long sleep length is related to metabolic disturbances who display concurrent sleep problems among individuals.[Vgontzas AN et al., 2014]. A China reported many Chinese had poor sleep quality, with decline in consumption of vegetables [Lee YT. Et al., 2018].

Another study from epidemiologic studies indicates that decrease in sleep duration or quality may increase the risk of diabetes. [Knutson KL et al., 2006].

Lack of sleep period is identified a contributor of cardio metabolic sickness, with negative diet pleasant as a probable intermediate. Although teachers with negative sleep quality are stated to have problems with work related. To date there are no studies assessing the relationship between sleep duration and adherence to healthy diets done in the North East population for teachers and it is essential to know the health of teachers which leads them to affect their health status and sleep pattern due to stress, anxiety. In addition, knowledge relating to the connection between sleep duration and dietary patterns is still sparse, although a cohort study in non obese Japanese male workers(aged40-59 years) showed that effect of short sleep duration on the prevalence of obesity was only partially explained by regular meal patterns [Nishiura C et al., 2010].

Thus, a cross-sectional survey was conducted in Nagaland, to evaluate the diet and sleep quality among teachers 30-50years.

AIM

To assess the diet and sleep quality of teachers age 30-50 years.

Objectives

- To assess the food consumption using the food frequency questionnaire.
- To assess sleep quality using PSQI.
- To assess the mean difference of actual food frequency consumption with the recommended balanced diet.
- To find the association between sleep quality and diet scores.

CHAPTER -2
REVIEW OF LITERATURE

2.1 Diet quality of teachers

A study was conducted to analyze nutrition habits of the teachers and nurses and found that nurses preferred fast food more than teachers and that the teachers have more positive nutrition habits than the nurses**[Emel M et al.,2010].** Teachers with unhealthy personal dietary habits were more likely to adversely impact their student's dietary patterns **[Elizabeth A.et al., 2020]**

Education and way of life predict change in dietary styles and diet quality of adults, there was steadiness in the dietary patterns distinguished over the long haul, while some said a general reduction of utilization of key nutrition types. Plan of sustenance advancement for more established grown-ups need to consider those with lower financial status as having lower level of instruction was an indicator of less fortunate dietary example..
[Maree G Thorpe et al.,2019]

2.2 Sleep quality

A study was conducted in China to find prevalence and risk factors of poor sleep quality among the elderly, and found that poor sleep quality was highly prevalent in urban Shanghai. The prevalence of poor sleep quality was 41.5% with higher rate seen in old females 45.8%, than males 35.8%. Developing consideration and far reaching countermeasures including psycho-social and individual exercises could reduce the sleep problem in the elderly. **[Jianfeng Luo et al., 2013]**

A study conducted in among college student showed that sleeping a normal of 7 hours, normal sleep quality was better connected with wellbeing, influence balance and sensations of pressure, depression, anger, exhaustion and confusion than normal sleep quantity. And average sleep was more related to sleepiness than sleep quantity. **[Pilcher J et al., 1997]**

2.3 Sleep and diet quality

A study conducted in Brazil to assess the relationship between food consumption and sleep patterns in healthy individuals. They concluded food consumption during the night time frame is connected with adverse consequences on the sleep quality of healthy individuals.**[Cibele Aparecida et al., 2011]**

A study was conducted in Sweden among adults to find the association of low energy density diet with high-energy-density diet. Contrasted and typical sleepers, short sleepers showed lower adherence to a healthy eating routine while utilizing both the mMED score and the HNFI score. Short sleepers with poor sleep quality showed an independent relationship with low adherence to a healthy diet compared with normal sleepers with good sleep quality. Moreover, short sleepers and long sleepers showed low adherence to normal meal patterns, when compared with avearge sleepers. And, short sleepers with poor sleep quality had less chance of having a normal meal pattern as compared with those who had normal sleepers along with good sleep quality [**Jenny H et al., 2006]**

A study conducted in the UK women adults found that sleeping the suggested length is related with increase in utilization of fruits and vegetables. More consumption of fruits and vegetables protect against certain diseases like diabetes, stroke, coronary heart diseases and some cancers. **[Noorwali, E.A, et al., 2018]**

A study was conducted in China, among 150 patients with liver cirrhosis. The prevalence of poor sleep quality was 47.1% and it was significantly associated with a risk of malnutrition. They concluded that sleep related were associated with malnutrition among older adults. Their result highlights the significance of good sleep quality and enough sleep in order to keep up with great dietary status.[**Yangyang Hui et al., 2021]**

A study was conducted in China among university students. The study was conducted to find the prevalence of obesity and overweight and its association with sleep quality. Sleep length is conversely associated with weight record (BMI) and weight gain in the future and the diet quality is associated with sleep length and normal sleep patterns. The PSQI was used to assess their sleep quality. The prevalence of obesity was higher in males than females. Relationship was found between sleep quality and BMI in females who consumed hypnotic drugs. The study shows that the sleep quality of females maybe associated with their BMI.

Undergrads are a special group of young adults so poor sleeping quality and their BMI may be vital for them, therefore the health status of university students can be improved. [**Jun Wang et al., 2019**]

Some evidence shows that a balanced diet can improve sleep quality and St. Onge sums up proof that particular foods such as milk, fatty fish and specific fruits may promote sleep. In over 4 years, it was observed that there was an increase in diet quality only in men. [**Marie-Pierre St. Onge et al., 2016**]

Study conducted in Canada among adolescents on lack of sleep as a contributor to obesity. They found that who had shorter sleeps, poor sleep quality, and late sleep times are completely connected with abundance of food consumption, poor diet quality, and obesity. Sleep, sedentary behavior, physical activity and diet influence each other and ultimately impact health. [**Jean P et al., 2016**]

Another study showed that low consumption of vegetables and poor eating habits with consumption of fast foods were all associated with poor sleep quality, short sleep duration in adolescents are related with exhaustion, it also includes lower academic performance, depressive mood, and behavior problems. [**Katagiri E et al., 2014**]

A China study was conducted on older adult population found that there was large consumption of rice, vegetables and low consumption of fruits. They found out that those who had low consumption of fruits and vegetables had poor sleep quality when compared with those who had higher consumption of fruits and vegetables. Respondents who reported eating wheat and half rice half wheat had good quality of sleep contrasted with seniors who reported rice as their staple food. [**Yen-Han L et al., 2018**]

A study was conducted to assess the relationship between sleep quality and the risk of type 2 diabetes. Total 563 patients participated and PSQI was used to assess their sleep quality. The median follow-up period was 2.5 years. They found that those who had poor sleep quality had higher risk of diabetes.[**Jung Ah L et al., 2016**]

A study conducted in China, to find the association of sleep duration with all cause mortality and cardiovascular. Short and long sleep durations are behavioral risk factors for resulting mortality and morbidity in adults. Constant short sleep is autonomous indicator of all cause mortality, cardiovascular events, metabolic dysfunction, obesity and poor psychological wellness. Constant long sleep predicts ultimately mortality, cardiovascular disease and mental debilitation. Overall increases in both short and long sleep duration may therefore herald deteriorations in generally among the populace wellbeing. They inferred that both long sleepers and short sleepers was related with high risk of all cause mortality and cardiovascular events. [**Jiawei Yin MD et al., 2017**]

CHAPTER -3

METHODOLOGY

METHODS

STUDY DESIGN:

This study is a cross-sectional study design. Data was collected via survey-interview.

STUDY SAMPLE:

A total of 157 teachers aged 30-50 years participated in this study.

STUDY LOCATION:

This cross-sectional study utilized data from teachers employed in school in the North Eastern state, Nagaland, India to examine correlation between teacher's sleep quality and their sleeping pattern.

STUDY TOOL:

Tools used were socio-demographic profile, food frequency questionnaire, Pittsburgh sleep quality index and self reported weight and height. Food frequency table was used to assess their diet quality and subjective sleep quality was evaluated using the Pittsburgh Sleep Quality Index(PSQI) and poor quality difficulty initiating, and poor quality of sleep was self-reported.

Measures

Demographic: Self-reported demographic data included teacher gender, age, education, marital status, hours of time spent in school.

Weight status Anthropometric measurements were self-reported. Height and weight were used to calculate BMI using the standard equation weight [kg]/height[m²]). For descriptive purposes, participants were categorized into five categories: underweight, normal, overweight and obese II according to World Health Organization.

Dietary quality assessment 8 food groups were used to assess their diet quality.

Pittsburgh sleep quality index(PSQI) This assesses sleep quality and sleep quantity and is a self-report questionnaire. It contains 7 component scores: subjective sleep quality, delay, length, habitual sleep order, distraction, use of sleeping treatment and day time disorder. [Buysse,1989]

The method used for scoring the sleep quality by the PSQI is given in annexure II.

STATISTICAL ANALYSIS

The data were collected using the questionnaires and were statistically analyzed. Than coding was done for each questions. Statistical Package for Social Sciences SPSS (SPSS version 28.0.1.1) was used for the results. In the software we have calculated descriptive mean and standard deviation for each food group. This was done by taking the mean, frequency and percentages. The p values ≤0.05 was considered significant and p values ≤0.001 was considered to be highly significant for the test applied.

The association between BMI and Sleep total score; Diet and Sleep total score is calculated using Chi square statistics. To check the statistical difference between the mean score of two groups independent t test and for more than 2 groups ANOVA statistics was applied.

Category 1: General information of teachers

Variables like gender, education marital status, hours spend in school, medical history, frequency distribution(N and %)were calculated. Mean and SD of hours slept per day was also calculated.

Category 2: Body weight and other variables

BMI was calculated as kilograms per meter square(kg/m²)using height and weight and the mean and SD were calculated. Then they were divided into categories as underweight(<18.5), normal(18.5-22.9), overweight(23-24.9), obese I(25-29.9) and obese II(≥30.0) according to the World Health Organization. Chi square was used to differentiate between the category and gender.

Category 3:Food related behavior of the teachers
In food analysis five questions were included. All answers were tabulated with frequency distribution(N and %).

Category 4: Food consumption per day of different food groups based on gender.
The mean consumption of each food groups for both the genders was calculated separately. Independent t test was applied to compare the mean consumption of each food group with its respective recommended amount per day at p<.05.
From the FFQ consumption of each food group was calculated as follows:
1. Converted weekly frequency into daily by dividing it with 7 (days).
2. Multiplied the per day frequency of each food item with its respective serving amount (g)
3. Sum of all the food items under each food groups had provided the total consumption of each food group per day in gram.
4. Mean ± SD was computed for 8 food groups.

Category 5: Gender-wise frequency of consumption of food items under each food groups was graphically presented to find the most frequently consumed food item in each food group.

Category 6: Sleep quality of the teachers

The scoring of PSQI was done according to the answers they provided. With that we calculated component wise score analysis of PSQI for both the gender separately and scores were given after. According to the PSQI, <=5 fall under normal sleep quality and >5 fall under poor sleep quality. A total of sleep score was made from their data and they were categorized as poor sleep and good sleep quality. Comparison ofmean sleep quality score was assessed across their socio demographic and lifestyle characteristics.

ANOVA/independent t statistical test was applied according to number of groups. Frequency of socio demographic characteristics like gender, BMI, occupation, education, food type, physical activity, coffee consumption, hours spend in school based on genderwas calculated under Sleep quality categories. The association of sleep quality scores as socio-demographic characteristics between the genders was assessed using chi square test.

Category 7: Comparison between sleep quality and diet quality

Diet was also divided into two categories as poor diet and good diet. Diet quality was calculated from each food groups and overall diet quality was made. The score of "0" was giving where consumption per day was less than the recommended per day consumption and "1" was given to the consumption equal and above the recommended per day consumption. The total food groups were 8. Therefore, the total diet score which a person could get is 8. Diet scores were categorized as poor diet and good diet. The diet score 0-4 considered as poor diet and above 4 as good diet. We were assumed that a person consuming more than 4 food groups according to their daily recommended amount could be considered good. The association of diet quality scores and sleep quality scores was assessed using chi square test based on genders.

CHAPTER -5
RESULTS

RESULTS

Table 1: General information of teachers

Socio demographic variable	Category	N(157)	%
Gender	Male	72	45
	Female	85	55
Education	Under graduate	107	68.125
	Post graduate	48	31.847
	Ph.D	2	1.25
Marital status	Married	25	16.875
	Divorce	2	1.25
	Single	130	81.875
Hours spend in school	5-6 hours	62	39.490
	6-7 hours	46	29.29
	4-5 hours	49	31.21
Lifestyle profile			
	Underweight(<18.5)	42	26.25

BMI	Normal(18.5-22.9)	73	47.5
	Overweight(23-24.9)	22	13.75
	Obese I(25-29.9)	16	10
	Obese II(≥30.0)	4	2.5
BMI (Mean±SD)	20.9 ± 4.2		
Medical history	Yes	8	5
	No	149	94.90
Age (Mean±SD)	39.55(6.26)		
Hours of sleep (Mean±SD)	7.47 (±1.33)		

Table 2: Pittsburgh Sleep Quality index among study participants.

Categories	Frequency (N)(%)
Normal sleep quality(<=5)	92(58%)
Poor sleep quality(>5)	65(41.40%)

Table 1:Sample characteristics

Data was collected from 157 teachers. Participants comprised of female(55%) and male(45%) in the age of 30-50 years (SD±6.26385). The teachers had higher education degree and among them, 68% were under graduate, 30% was post graduate and 1.25% was Ph.D. Most of them were single (81.875%), some were married (16.875%) and divorce(1.25%).

They were also asked how many hours they spend in school, 40 % spent 5-6 hours, 28.75% spent 6-7 hours and 31.25% spent 4-5 hours.

Lifestyle profile

Regarding the individual health perception of teachers 46% was under normal while 26% were underweight, 14% were overweight and 10 % were under obeseI and 2.5% were under obeseII and 95% had no medical record.

The mean BMI was 20.9 and standard deviation of ±4.2.

The mean hours of sleep of the teachers was 7.47 ±1.33 (table1).

Table 2:Prevalence of poor sleep quality

The sleep quality was poor in 41.25% and was normal in 58% of the participants.

Table 3 : Food behavior of the teachers

Food Behavior	N	%
Meals per day		
4-5	20	12.5
2-3	132	84.076
Once	5	3.125
Do you skip meals?		
Yes	28	17.5
No	52	32.5
Sometimes	77	49.04
How would you rate your diet?		
Excellent	2	1.25
Good	63	40
Neutral	68	43.3
Poor	24	15.28
Food type preference		
Healthy	104	66.24
Fast food	33	21.019
Others	20	12.7
Food type		
Non-veg	149	94
Veg	8	5.09

Table 3: Dietary behavior

Participants were asked about their food behavior in table 2. 12% consumed 4-5 meals per day, 84% consumed 2-3 times a day and 3% rarely consumed meals. 32 % said they don't skip meals, 17 % said they skipped and 49% skipped sometimes. Regarding the individual health of teachers, it was found that 43 % considered that their health as neutral and 15 % said it was poor and 40 % said it was good, while 1.25 % said it was excellent. Majority of them chose healthy diet(65.6%), while 21% chose fast foods and 12.7 % chose others. 94 % were non-veg while 5% was veg.

Food consumption of different food items under different food groups compared across gender

CEREALS & MILLETS(Graph 1):

Rice
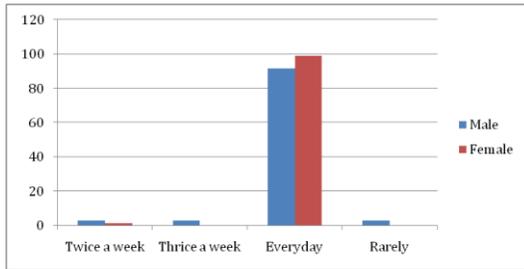
Sukha roti
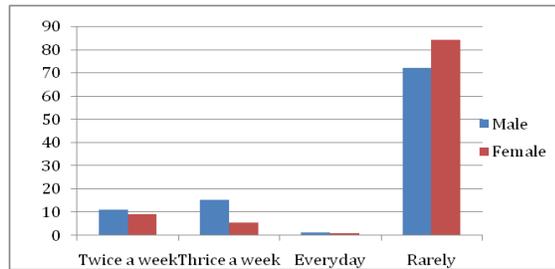
Puri
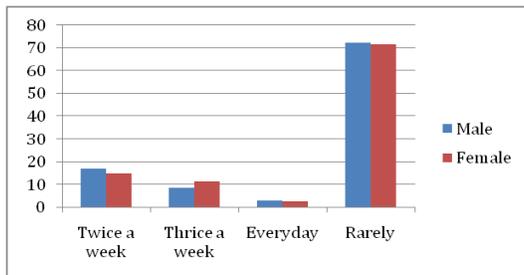
White bread
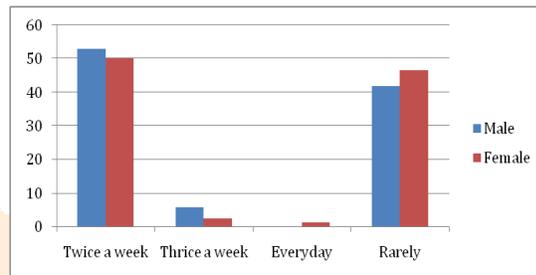
Brown bread
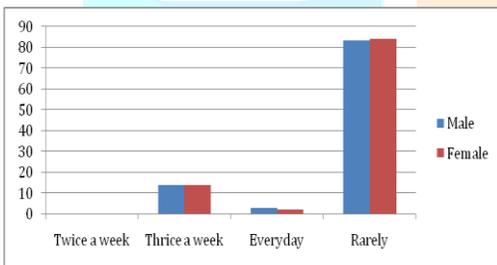
Majority of the teachers both male and female consumed rice everyday(95.625%), and white bread was consumed often(51.25%). Whereas brown bread was the least consumed(83.75%), followed by sukha roti(78.75%) but(1.25%) consumed everyday and puri was rarely consumed (71.875%).

MILK & MILK PRODUCT(Graph 2):

Whole milk
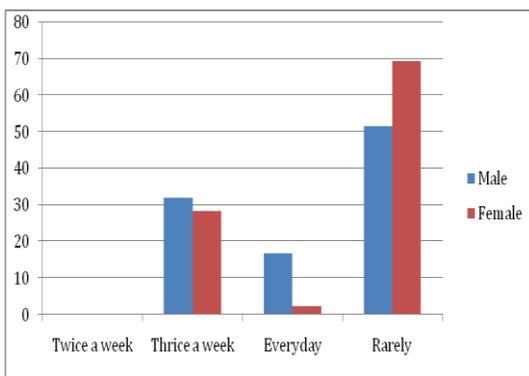
Low fat milk
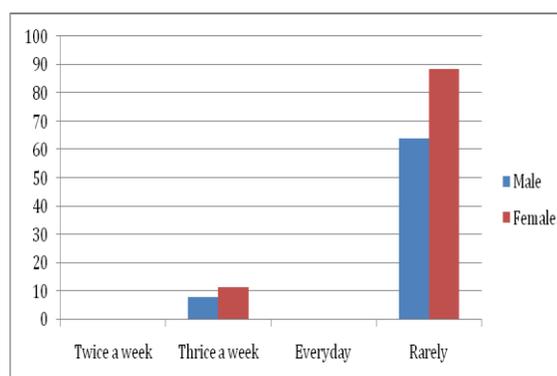
Curd
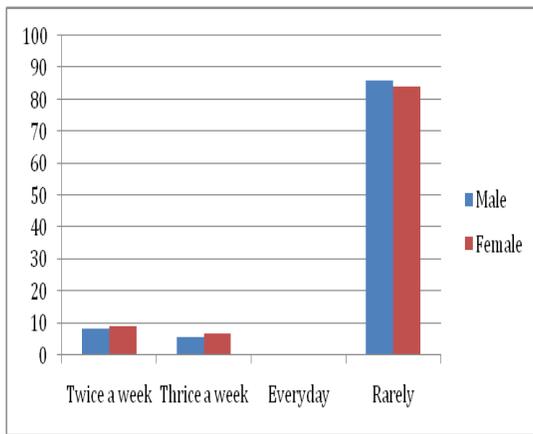
Skim Milk
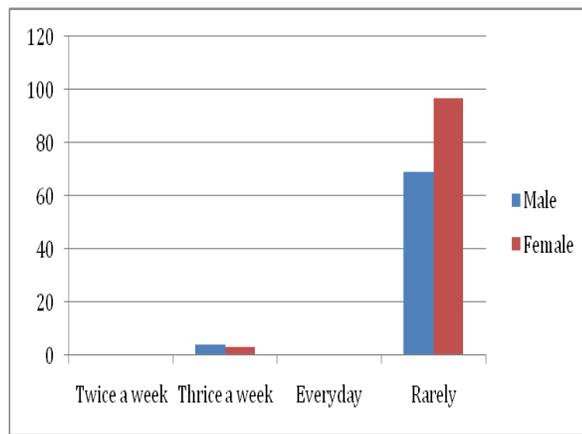
Whole milk was often consumed and more by male teachers(30.9%), Curd(8.8%)and low fat milk(11.3%) was consumed at least twice a week, whereas, skimmed milk was rarely consumed by the teachers(96.3%),

ANIMAL & ITS PRODUCT(Graph 3)

Fish
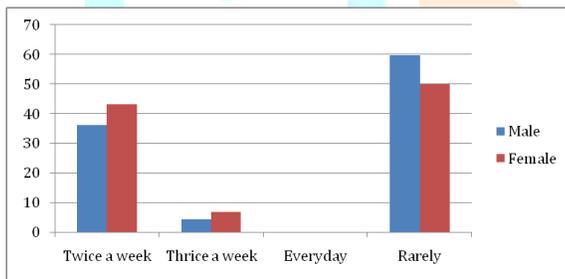
Hamuk
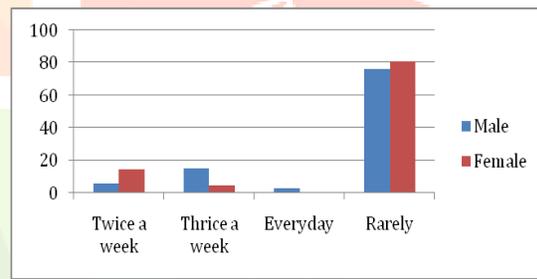
Prawn
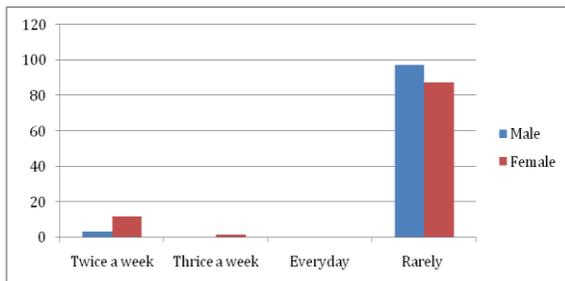
Meat
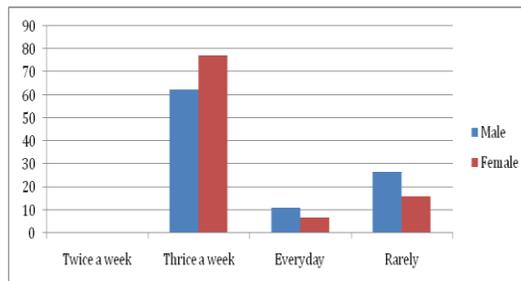
Fermented dry fish
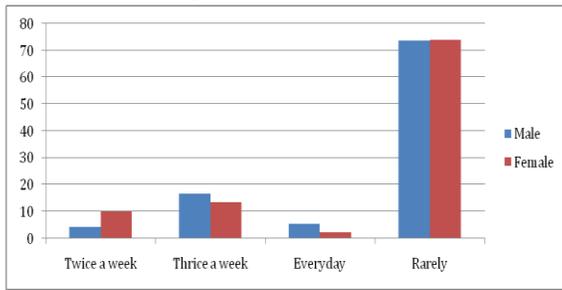
In animal and animal product, meat was the most consumed(70.6%) followed by fish (40%) and fermented dry fish(15%), the least consumed was mollusks()10.6%)and prawn(7.5%).

PULSES & LEGUMES(Graph 4):

Peas
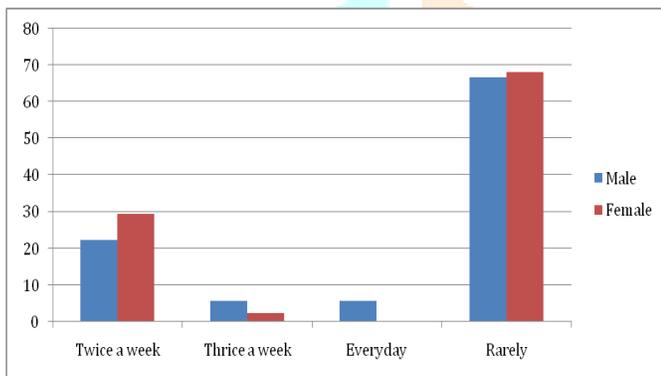
Rajma
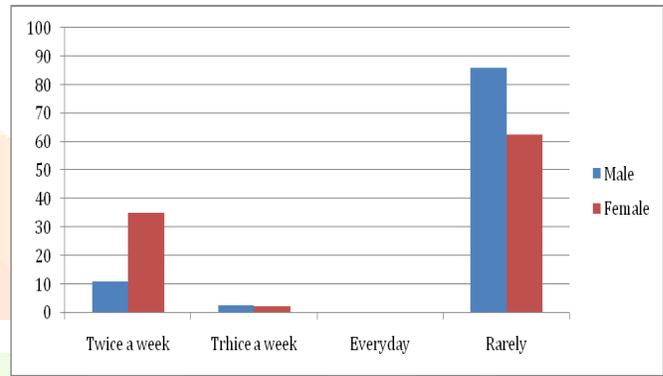
Soybean
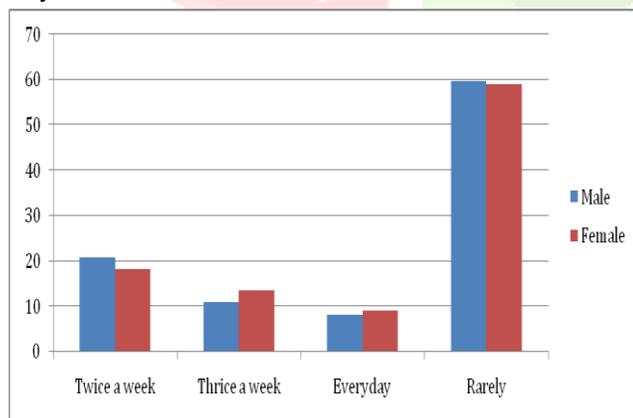
Lentils
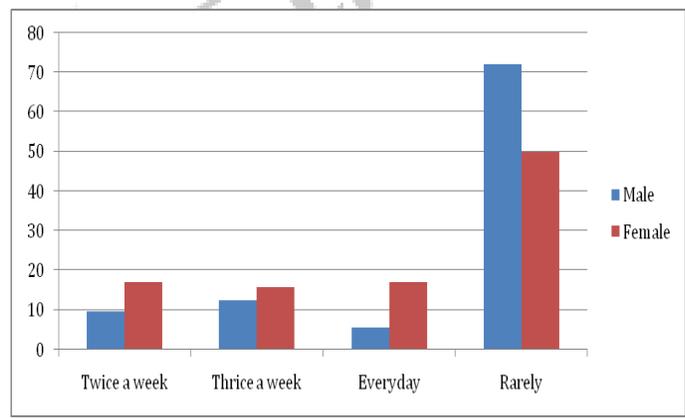
In pulses and legumes the most consumed was soybeans(26.25%)at least twice a week and lentils(11.9%)on daily basis. The least consumed was peas(67.5%) followed by rajma(73.1%).

VEGETABLE(Graph 5):

## Mustard leaves
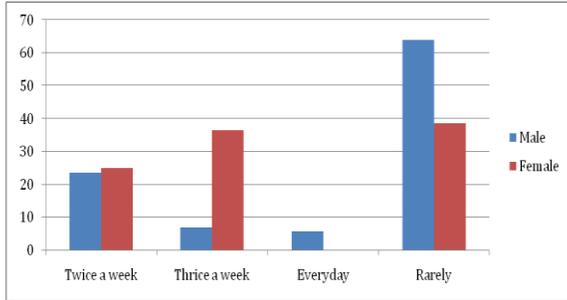
Yam leaves
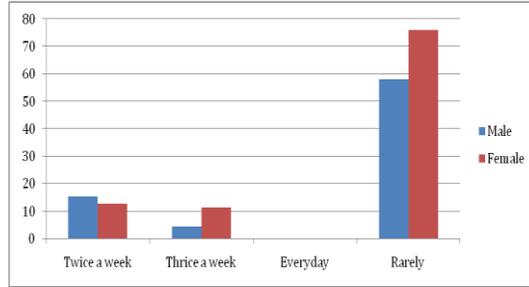
Chinese knotweed
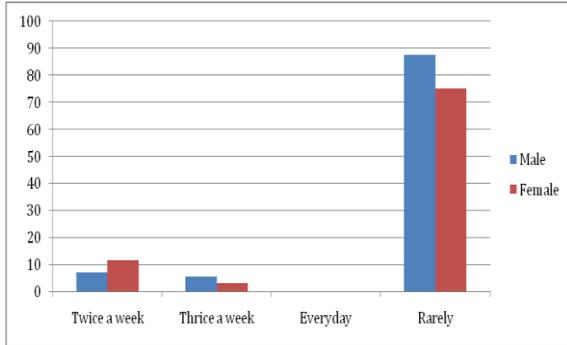
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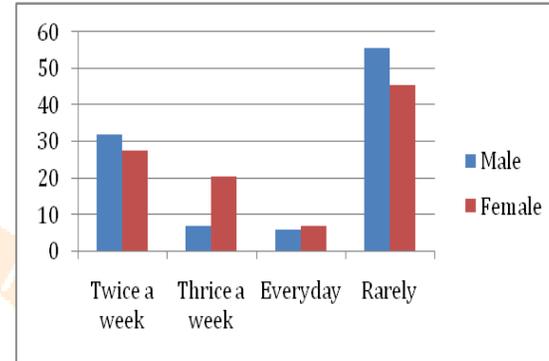
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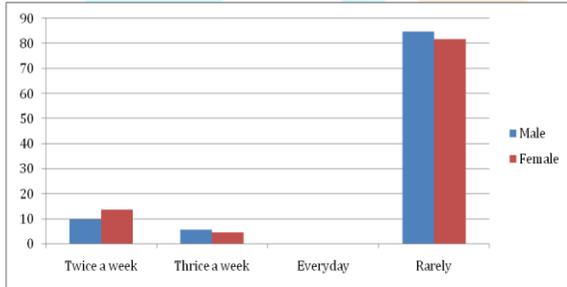
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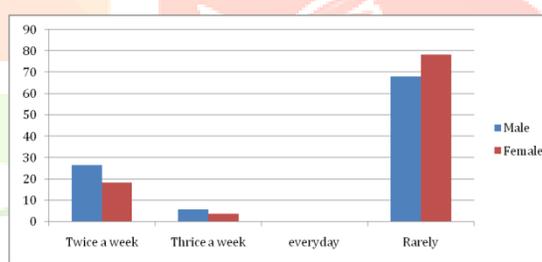
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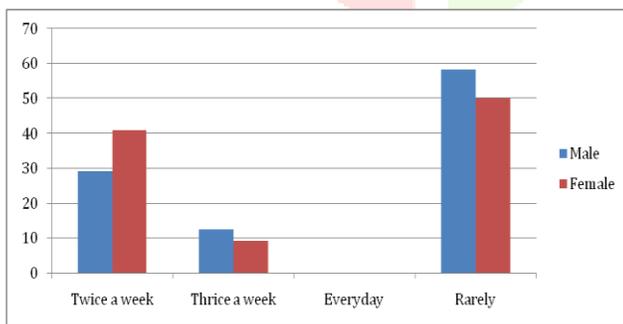
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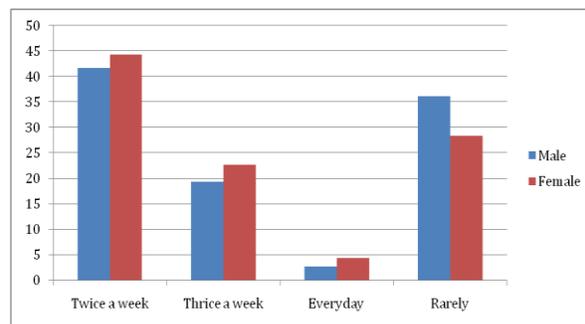
Pumpkin leaves
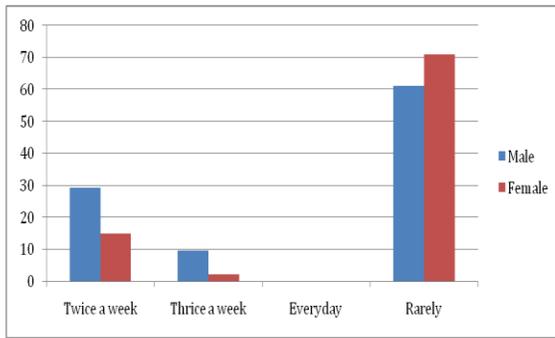
Bamboo shoot
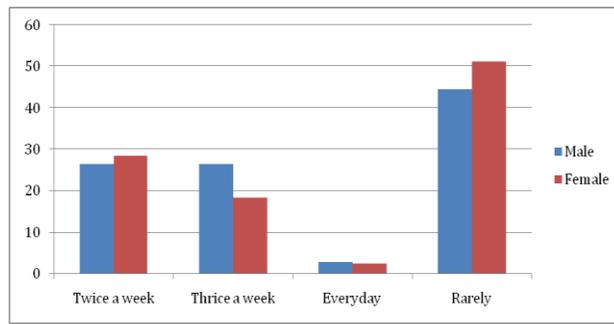
Cauliflower
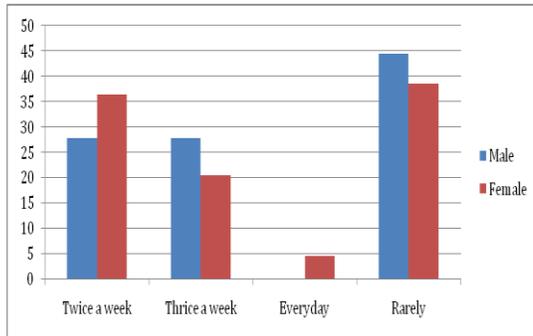
Lady finger
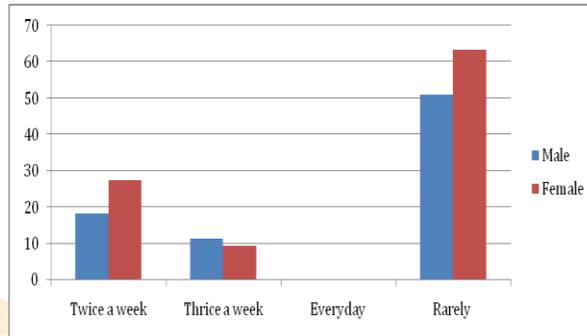
Carrot
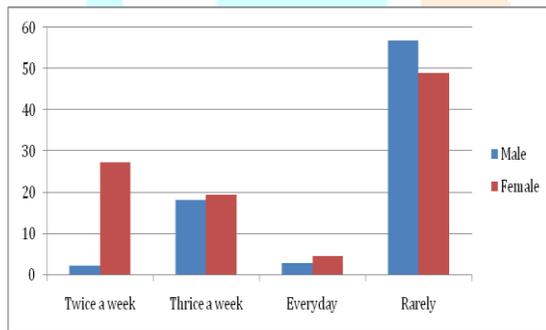
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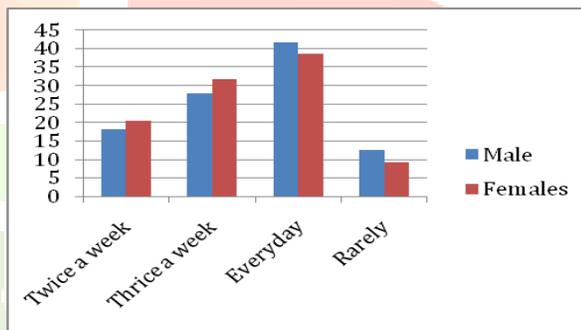
Yam
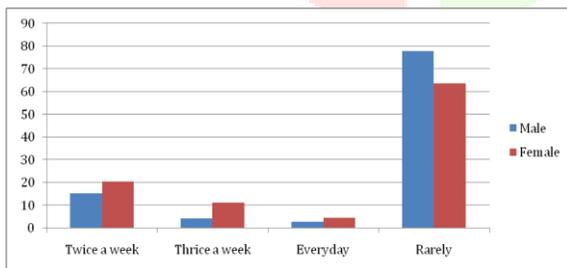
Banana stem
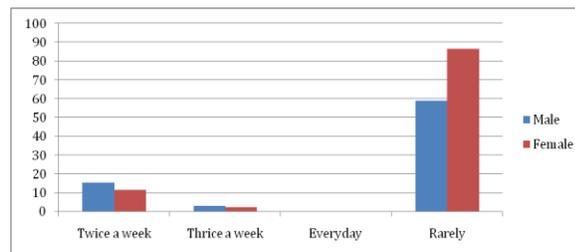
Brinjal
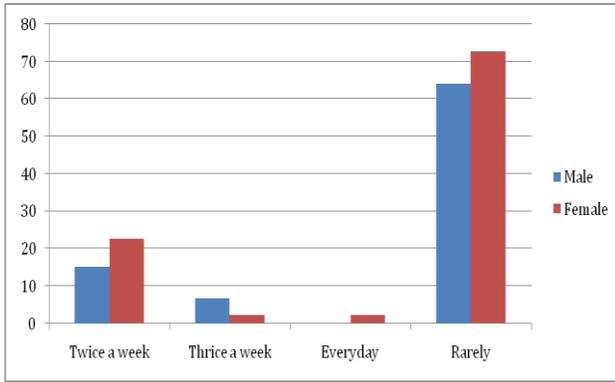
Cabbage was the most consumed vegetable(43.1%) Potato was consumed everyday(40%) followed by cauliflower(32.5%), broccoli(35.6%) and bamboo shoot(27.5%)and squash(29.375%) and lady finger(23.125%) and yam(18.1%), yam leaves(13.75%) and mustard leaves(24.3%) were all consumed at least twice a week. The least consumed was Chinese knotweed(86.25%) banana stem(84.375%)followed by eggplant(83.125%), bittergourd(73.75%), pumpkin leaves(71.875%)and brinjal(75%).

FRUITS(Graph 6):

Apple
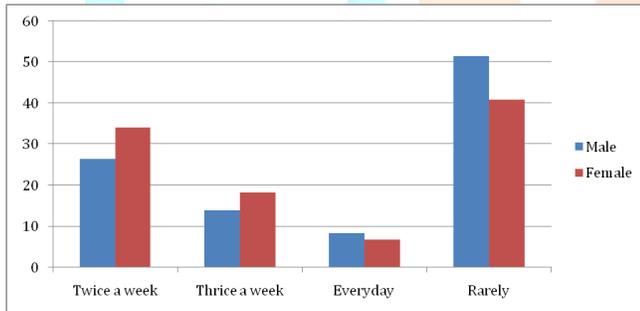
Orange
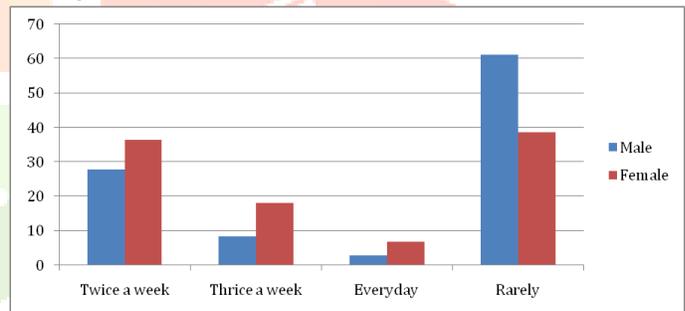
Guava
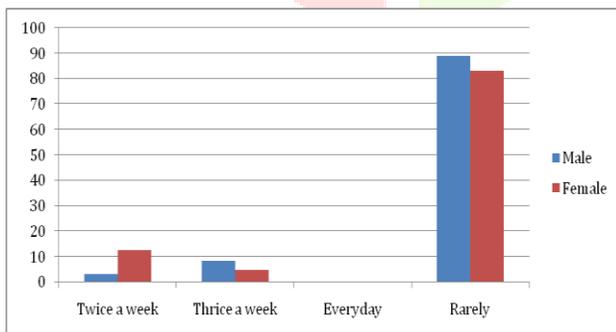
Peach
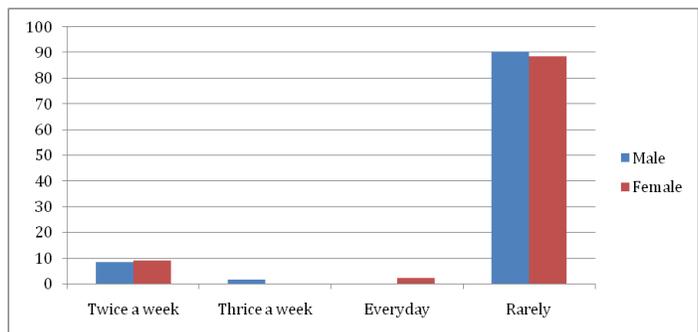
Tomato
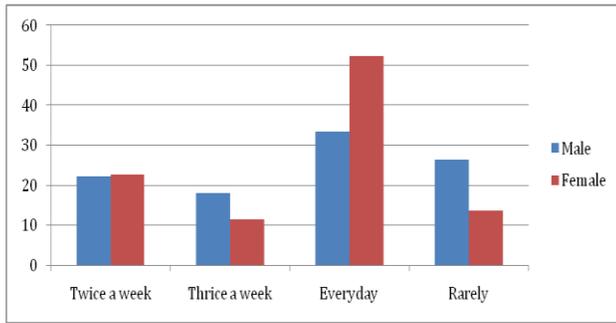
Banana
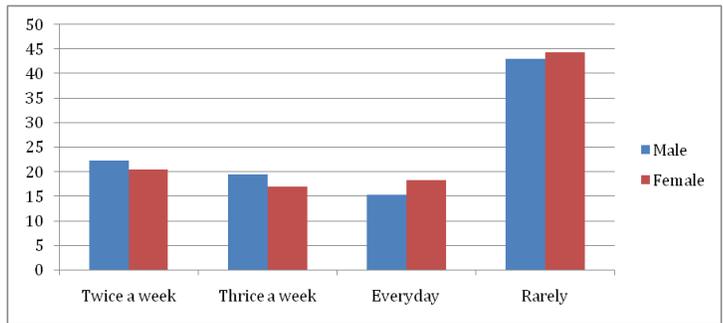
Passion fruit
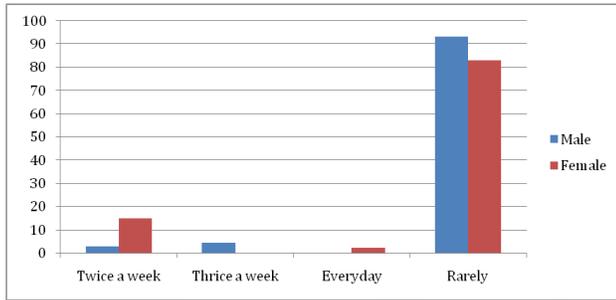
Star fruit
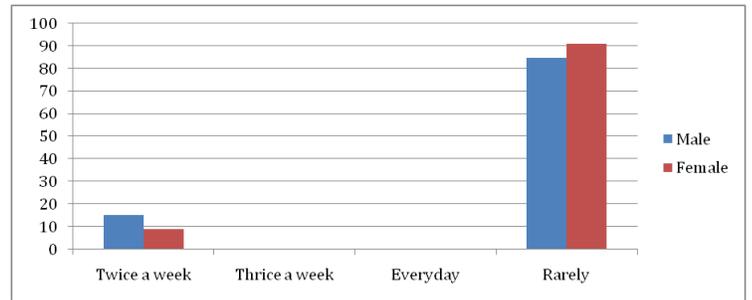
Indian plum
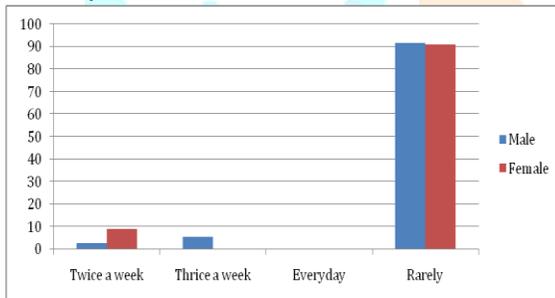
Tomato was the most consumed fruit(43.8%) and banana(16.875%) on daily basis. Apple(30.625%)and orange(32.5%) was often consumed atleast twice a week. The least consumed was Indian plum(91.25%) and peach (89.4%) passion fruit (87.5%)but was atleast consumed twice a week(9.4%) and star fruit(88.1%) was rarely consumed.

OILS/FATS(Graph 7):

Cooking oil
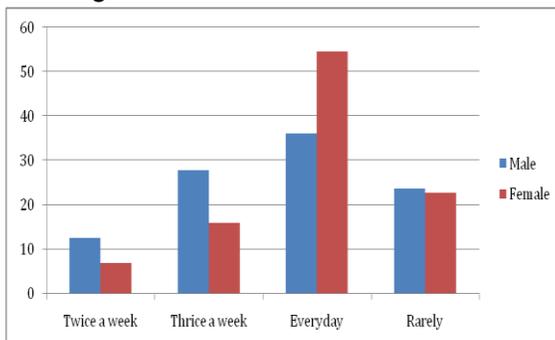
Ghee
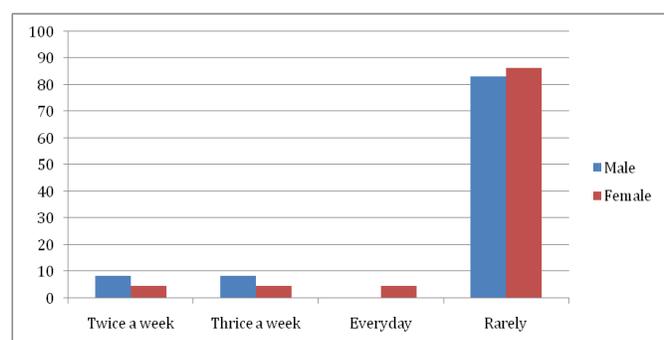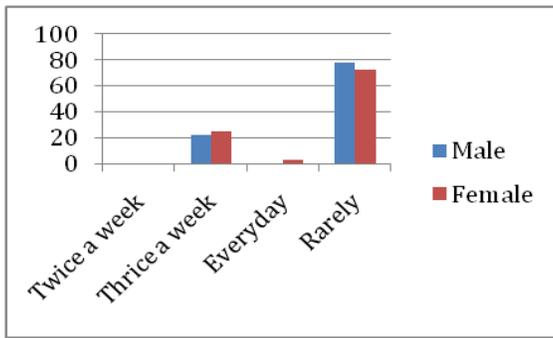
Butter   Nuts
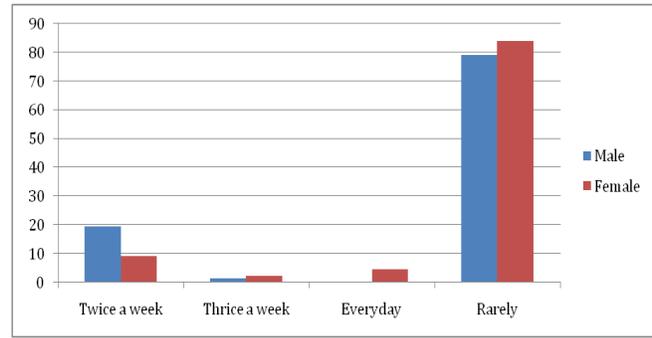
Most of them consumed cooking oil on daily basis(46.25%)consumed more by female(54.5%).) Butter was consumed by female teachers at least thrice a week(25.0%)

Nuts was rarely consumed by the teachers(81.875%) with (2.5%) everyday and (13.75%) twice a week and (1.875%) thrice a week.

The least consumed was ghee(85%)but male teachers consumed atleast twice a week(8.3%).

SUGAR(Graph 8):
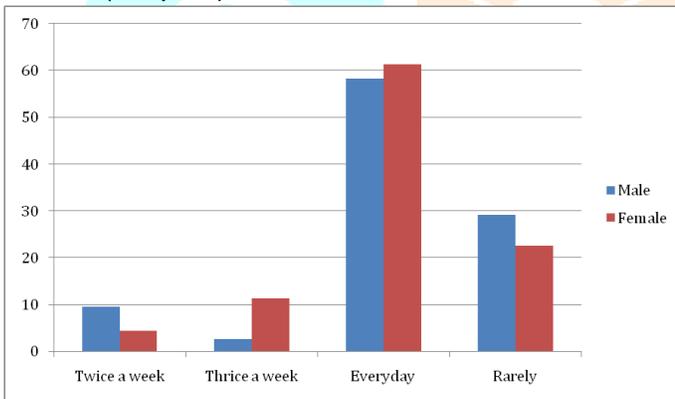
Sugar was highly consumed by the teachers on daily basis(60%), female teachers consumed higher than male teachers(61.4%)

Table 4 : Item wise ratings of Pittsburgh Sleep Quality Index(PSQI)

PSQI Questions	Not during the past month	Less than once a week	Once or twice a week	Three of more times a week
Q5a)Cannot get to sleep within 30 minutes	132(84.07)	16(10.19)	7(4.45)	2(1.27)
Q5b)Wake up in the middle of the night or early morning	20(12.7)	23(14.64)	110(70.06)	4(2.54)
Q5c)Have to get up to use the bathroom	151(96.17)	6(3.83)	--	--

Q5d)Cannot breathe comfortably	154(98.08)	3(1.91)	--	--
Q5e)Cough or snore loudly	157(100)	--	--	--
Q5f)Feel too cold	157(100)	--	--	--
Q5g)Feel too hot	155(98.72)	2(1.27)	--	
Q5h)Had bad dreams	156(99.36)	1(0.63)	--	--
Q5i)Have pain	156(99.36)	1(0.63)	--	--
Q5j) Other reason(s), please describe:	157(100)	--	--	--
Q6) During the past month, how often have you taken medicine to help you sleep(prescribed or "over the counter")?	148(94.26)	4(2.54)	3(1.91)	2(1.27)
Q7) During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?	135(85.98)	4(2.54)	4(2.54)	14(8.91)
	No problem at all	Only a slight problem	Somewhat of a problem	A very big problem
Q8) During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?	63(40.12)	47(29.9)	35(22.29)	12(7.64)
	Very good	Fairly good	Fairly bad	Very bad
Q9) during the past month, how would you rate your sleep quality overall?	20(31.4)	99(63.05)	35(22.29)	3(1.91)

Average time to sleep was 3am and average waking up time was 11am.

Majority of the participants had no trouble sleeping, only 16 of them could not get sleep within 30 minutes. Most of the study participants woke up at night or early morning. From the study, some reported problem in staying awake while engaging in social activity. Approximately 36 reported their sleep quality to be fairly poor or very poor (Table 4).

Table 5: Component wise score analysis of PSQI for male.

PSQI Component	Mean	SD
Subjective Sleep quality	.52	.91
Sleep latency	1.64	.76
Sleep duration	.61	.74
Sleep efficiency	.43	.72

Sleep Disturbance	.92	.26
Day Dysfunction	.10	.46
Sleep Medicine	.90	.88

Table 6: Component wise score analysis of PSQI for female.

PSQI Component	Mean	SD
Subjective Sleep quality	.50	.90
Sleep Latency	1.66	.77
Sleep duration	.61	.74
Sleep efficiency	.45	.75
Sleep disturbance	.92	.26
Day dysfunction	.10	.45
Sleep Medicine	.87	.88

Majority of the teachers had normal sleep quality(58%), (41.25%) had poor sleep quality. Practiced of sleep delay was very high among the participants and the mean component for sleep delay was highest. The mean of sleep disturbance is also high, sleep disturbance related to nocturnal awakenings is more usual as compared to other. It means high difficulty of sleep latency and sleep disturbance is a major contributor to poor sleep quality of the teachers.

Table 7: Component scores of PSQI.

Sl No	PSQI Component item	Scores			
		0	1	2	3
1.	Subjective sleep quality	119(75.79)	--	35(22.29)	3(1.91)
2.	Sleep latency	10(6.36)	51(32.48)	77(49.04)	19(12.10)
3.	Sleep duration	78(49.68)	43(27.38)	26(16.56)	10(6.36)
4.	Sleep efficiency	107(68.15)	35(22.29)	8(5.09)	7(4.45)
5.	Sleep disturbance	12(7.64)	145(92.35)	--	--
6.	Day Dysfunction	148(94.26)	4(2.54)	3(1.91)	2(1.27)
7.	Sleep medicine	59(37.57)	71(45.22)	14(8.91)	13(8.28)
*Sleep duration 0=slept for more than 7 hours, 2=slept for 6-7 hours, 3=slept for 5-6 hours, 4=slept for less than 5 hours					

(*values represents N%)

Table 7 depicts that out of 157 teachers, (75%) said they rate their sleep quality very good. Majority of the teachers slept more than 7 hours(78%). Whereas, (43%) slept 6-7 hours and (10%) of the teachers slept less than 5 hours.

Table 8: Prevalence of poor sleep quality in sociodemographic and lifestyle categories.

Socio demographic variable	Category	Good(<=5) N %	Poor(>5) N %	X²test p N %
Sex	Male	48(66)	24(33.4)	.059
	Female	44(51)	41(48.23)	
Education	Under Graduate	69(43)	38(24.20)	.001
	Post graduate	22(14.01)	26(16.56)	
	Ph.D	1(0.63)	1(0.63)	

Marital status	Married	22(14.01)	3(1.91)	.001
	Divorce	--	2(1.27)	
	Single	70(44.58)	60(38.21)	
Food type	Non-veg	84(53.50)	65(41.40)	.015
	Veg	8(5.09)	--	
BMI	Underweight(<18.5)	19(12.10	23(14.64)	.045
	Normal(18.5-22.9)	43(27.38)	30(19.10)	
	Overweight(23-24.9)	20(12.7)	2(1.27)	
	Obese I(25-29.9)	8(5.09)	8(5.09)	
	Obese II((≥30.0)	2(1.27)	2(1.27)	
Hours spend in school	5-6 hours	40(25.47)	22(14.01)	.046
	6-7 hours	20(12.7)	26(16.56)	
	4-5 hours	32(20.38)	17(10.82)	

(*pvalue is t test)

(*values represents N%)

It was observed that marital status was significant with the sleep quality(X^2test p=.001). Hours spend in school was also significant with sleep quality(X^2test p=.046). There was significant association between sleep quality and education of the teachers(X^2test p=.001).There was also significance between food type and sleep quality(X^2test p=.015) The vegetarian subjects had better sleep quality and none of them fall under the poor sleep quality than when compared to non-veg(Table 8).

Table 9: Mean PSQI scores as per socio demographic categories(t/f test).

Socio demographic variable	PSQI scores					
	Categories	N	Mean	SD	t/f	Pvalue
Gender	Male	72	1.52	0.50	3.605	.059
	Female	85	1.54	0.49		
BMI	Underweight(<18.5)	42	20.7	4.4	2.500	.045
	Normal(18.5-22.9)	73	20.9	4.2		
	Overweight(23-24.9)	22	20.9	4.2		
	Obese I(25-29.9)	16	20.9	4.4		
	Obese II(≥30.0)	4	21.1	4.3		
	5-6 hours	62	1.89	0.83		

Hours spend in school	6-7 hours	46	1.91	0.84	3.133	.046
	4-5 hours	49	1.92	0.84		
Consumption of coffee	2-3/day	30	2.28	0.77	.156	.856
	Often	49	2.31	0.76		
	Rarely	78	2.30	0.77		
Physical exercise	Yes	82	1.30	0.463	7.645	.006
	No	75	1.60	0.493		

Consumption of coffee was reported 49% of the participants. Of the participants studied, 52% had physical activity 47.5% reported they didn't had any physical activity. 39 % spent 5-6 hours. It was observed that the mean poor quality and good quality sleep scores were significant across the BMI categories (f test p=.045). Male had higher mean score of good sleep quality as compared to female. (Table 9)

Table 10:Comparison of mean consumption of food groups (g/d) with the recommended balanced diet intake for male:

Food groups	Balanced diet	Consumption		Pvalue
		Mean	**SD**	
Cereals and millets	360	252.62	91.78	.059
Pulses & legumes	90	12.56	20.25	.890
Milk & milk products	300	73.64	68.03	.688
Animal product	30	101.85	89.11	.128
Vegetable	300	212.50	169.33	.003
Fruits	100	74.58	67.38	.030
Fats	25	9.76	9.34	.333
Sugar	25	3.54	2.28	.135

(*pvalue is t test)

As per the recommended dietary consumption, male teachers are consuming slightly lower in cereals & millets, and pulses & legumes are consumed very less. Milk & milk product is also consumed very less whereas for animal product is consumed more than the recommended consumption. Vegetable and fruits is consumed slightly lower as per the recommended consumption, oil and sugar is consumed very low as per recommended. A significant association was observed between the recommended balanced diet and the consumption of vegetable(X^2test p=.003).

Table 11:Comparison of mean consumption of food groups (g/d) with the recommended balanced diet intake for female:

Food groups	Balanced diet	Consumption		Pvalue
		Mean	**SD**	
Cereals& millets	270	249.71	70.68	.059
Pulses & legumes	60	16.37	18.29	.890
Milk & milk product	300	50.59	66.54	.688
Animal product	30	101.68	79.55	.128

Vegetable	300	209.88	121.32	.003
Fruits	100	81.59	53.10	.030
Fats	20	8.98	9.16	.333
Sugar	20	4.03	2.38	.135

As per the recommended dietary consumption, female teachers are consuming slightly lower in cereals & millets, and pulses & legumes are consumed very less. Milk & milk product is also consumed very less whereas for animal product is consumed more than the recommended consumption. Vegetable and fruits is consumed slightly lower as per the recommended consumption, oil and sugar is consumed very low as per recommended. Significant association was observed between the recommended balanced diet intake and the consumption of vegetable(X^2test p=.003).

Table 12: Association of sleep quality and diet quality across gender.

Diet score	Sleep score	
	Poor sleep	Good sleep
Poor diet	62(88.6)	69(79.3)
Good diet	8(11.4)	18(20.7)

*(*pvalue for male is 0.150 and female is 0.408)*

Graph 9 : Association of sleep quality and diet quality of male
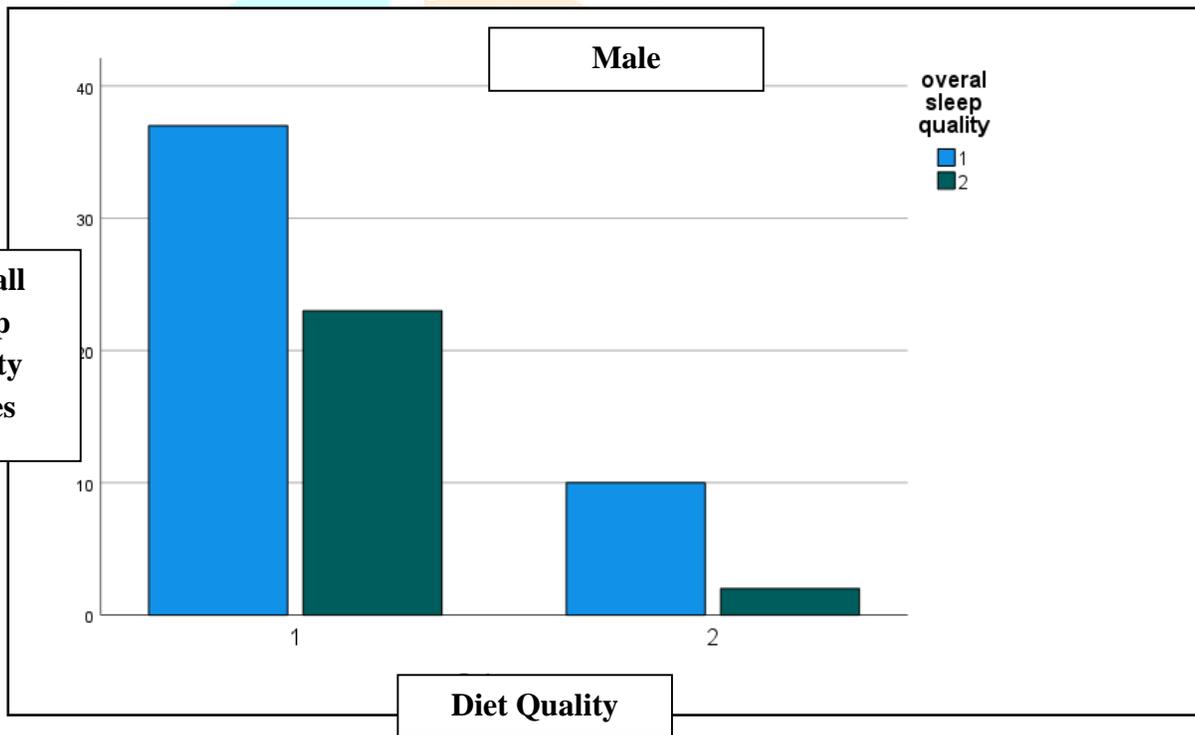
Diet quality (1=Good diet, 2=poor diet); Sleep quality (1=poor sleep; 2= good sleep)

Graph 10 : Association of sleep quality and diet quality of female
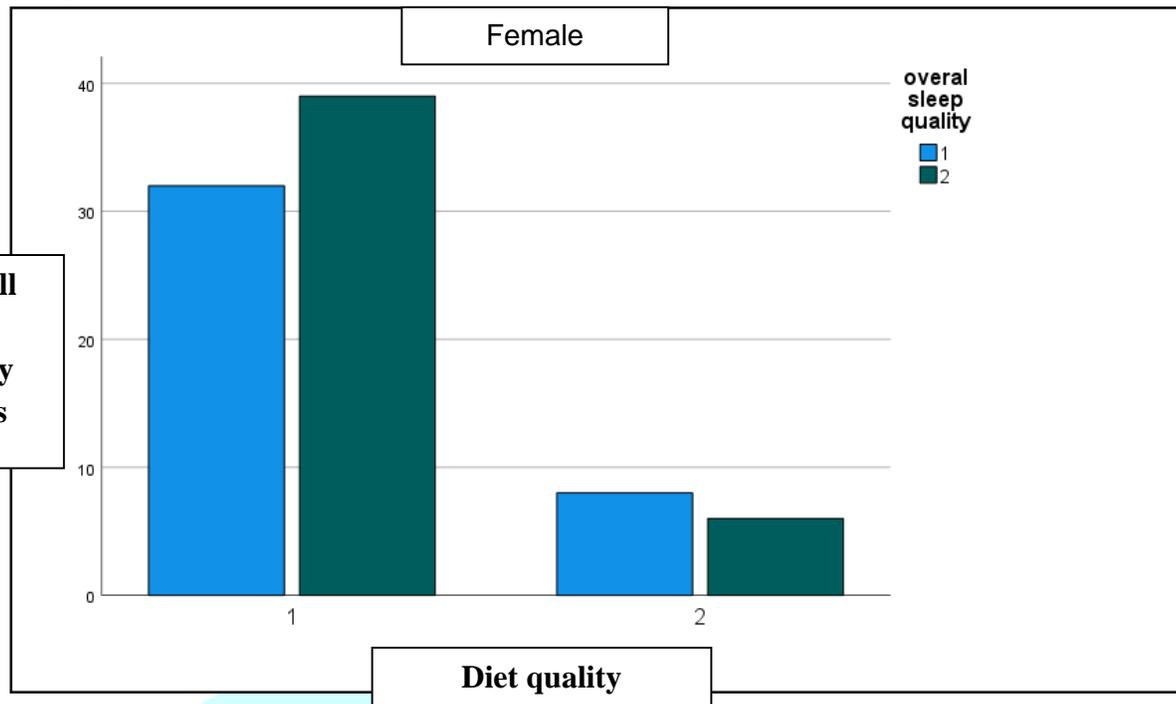
Diet quality (1=Good diet, 2=poor diet); Sleep quality (1=poor sleep; 2= good sleep)

Table 12 depicts the association between diet and sleep quality of the teachers.

Than diet quality and sleep quality was assessed using chi square test based on genders.

Majority of the teachers had poor sleep quality and poor diet quality(88.6%) also those with good sleep and good diet was very less(20.7%). There was no significance between the diet score and the sleep score of both the genders(male pvalue=0.150 and female pvalue=0.408).

DISCUSSION

The study was conducted in the North East of India, Nagaland. One fifty seven (157) teachers of both sexes participated in the study. Here, we evaluated cross-sectional assessment of diet and sleep quality. Nagaland is known as "Land of Festival" with a whooping number of different tribes and cultural diversity that they bring, with contrast in language, all tribes have a comparable clothing regulation, dietary patterns and traditional laws. Naga cuisines are devoid of spices and are to a great extent founded on the staples they track down in their environmental factors..

A total of 157 teachers aged 30-50 years, has been analyzed in a survey. Food frequency questionnaire was used to assessed their dietary intake and subjective sleep quality was assessed using the PSQI, self reported height/weight(BMI). There is no such study done in the North East population for teachers and it is essential to know the health of teachers which leads them to affect their health status and sleep pattern due to stress, anxiety.

From the food frequency questionnaire, questions were asked on what food they consumed on daily basis including all the 8 food groups. The people of North East consumed rice on daily basis, 95% consumed rice on daily basis, and 1 % consumed rarely. Sukha roti was consumed rarely(78%), 1% consumed daily. Puri was

consumed rarely(71%). White bread is also highly consumed(51%), whereas brown bread are rarely consumed. Pulses and legumes are rarely consumed and milk products are consumed at moderate amount whereas fish(40%) and meat(70%)are consumed frequently. Green leafy vegetables are consumed moderately. Potato are highly consumed(40%). Tomato are also highly consumed(43%). Fruits are also consumed often but oil is consumed by majority(46%). Fats are also consumed very low but sugar are consumed highly by majority(60%) and nuts are rarely consumed(81%). Beverages are also rarely consumed(92%).

The people of North East consumed rice on daily basis. Rice is the staple food for Nagas and in the absence of a culture of breakfast and snacks rating, often guests are offered with a plate of rice and meat. Common dishes of Nagaland includes fermented bamboo shoots often served with fish and pork and anishi are fermented taro leaves and it's an Ao tribe delicacy and akhuni(axone), which is a made from fermented soybean frequently served with beef and smoked pork, it's a Sema tribe delicacy. Galho is a blend rice dish made from a combination of rice, various meats and vegetables. Smoked meat is usually kept above a fireplace or anywhere in the kitchen for 1 day to 14 days or longer. Yongjack (Parkia speciosa) are long tree beans frequently consumed cooked over coals, and are much of the time exchanged bunches.

From the subjective sleep quality questionnaire, the average time to sleep was 3am and average wake up time was 11am.

Majority of the participants had no trouble sleeping, only 16 of them could not get sleep within 30 minutes. Most of the study participants woke up at night or early morning. Some of the participants reported problem in staying awake while engaging in social activity. It is one of the critical reasons for terrible showing and efficiency. It impacts on the quality of life of the individual. Participants rated their sleep quality to be fairly poor. It means that these study participants themselves consider their sleep quality to be bad. And 100 of them rated fairly good. (Table 4).

Teachers faces the challenge in their professional and personal life. Quality of sleep likewise influenced the actual wellbeing, emotional well-being and personal satisfaction in teachers. Majority of the teachers had normal sleep quality(58%), (41.25%) had poor sleep quality. Sleep delay related to have trouble sleeping and cannot get to sleep within 30 minutes or hours. The mean of sleep disturbance is also high, sleep disturbance related to nocturnal awakenings is more usual as compared to other. It means high difficulty of sleep latency and sleep disturbance is a major contributor to poor sleep quality of the teachers. It means high burden of sleep delay and sleep distraction is a major contributor to poor sleep quality of the teachers. (table5)(table6)

Table 7 depicts that out of 157 teachers, (75%) said they rate their sleep quality very good. Majority of the teachers slept more than 7 hours(78%). Whereas, (43%) slept 6-7 hours and (10%) of the teachers slept less than 5 hours.

It was observed that marital status was significant with the sleep quality(χ^2test p=.001). Hours spend in school was also significant with sleep quality(χ^2test p=.046). There was significant association between sleep quality and education of the teachers(χ^2test p=.001). There was also significance between food type and sleep

quality(χ^2test p=.015). The vegetarian subjects had better sleep quality and none of them fall under the poor sleep quality than when compared to non-veg(Table 8).

Consumption of coffee was reported 49% of the study participants. Among the teachers, 52% had physical activity 47.5% reported they didn't had any physical activity. 39 % spent 5-6 hours, 29% spent 6-7 hours and 31.21% spent 4-5 hours in school.

It was observed that the mean poor quality and good quality sleep scores were significant across the BMI categories(f test p=.045). Male had higher mean score of good sleep quality as compared to female.(table 9).

Table 12 depicts the association between diet and sleep quality of the teachers. Scores under or equivalent to five were related with good sleep quality and coded as 1 and score more than five were under the category of poor sleep quality and coded as 2.

Diet was also divided into two categories as poor diet coded as 2 and good diet was coded as 1.

Than diet quality and sleep quality was assessed using chi square test based on genders.

Majority of the teachers had poor sleep quality and poor diet (88.6%) also those with good sleep and good diet was very less(20.7%). Majority of the teachers had poor diet quality as well as sleep quality. There was no significance between the diet score and the sleep score of both the genders(male pvalue=0.150 and female pvalue=0.408).

Chapter -6
CONCLUSION AND SUMMARY

SUMMARY AND CONCLUSION

 This study was conducted to assess the diet and sleep quality of teachers. In this study there are 157 teachers from north east, India. In this, we have collected data via survey based with questionnaires consisting of food frequency questionnaire, lifestyle behaviors and dietary pattern of the participants and sleep quality was assessed using the PSQI. And the data was compiled in excel sheets. And in SPSS software results was formed..
It was observed that majority had normal sleep quality but had poor diet quality.

There we could conclude from the study that lack of poor diet habits and poor sleep contributes to unhealthy lifestyle and wellbeing of an individual. More studies with large sample size would be needed to check the true association between diet and sleep and its impact on other health conditions. People should give more importance to one's own health and wellbeing and live a healthy lifestyle.

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ANNEXURE

QUESTIONNAIRE
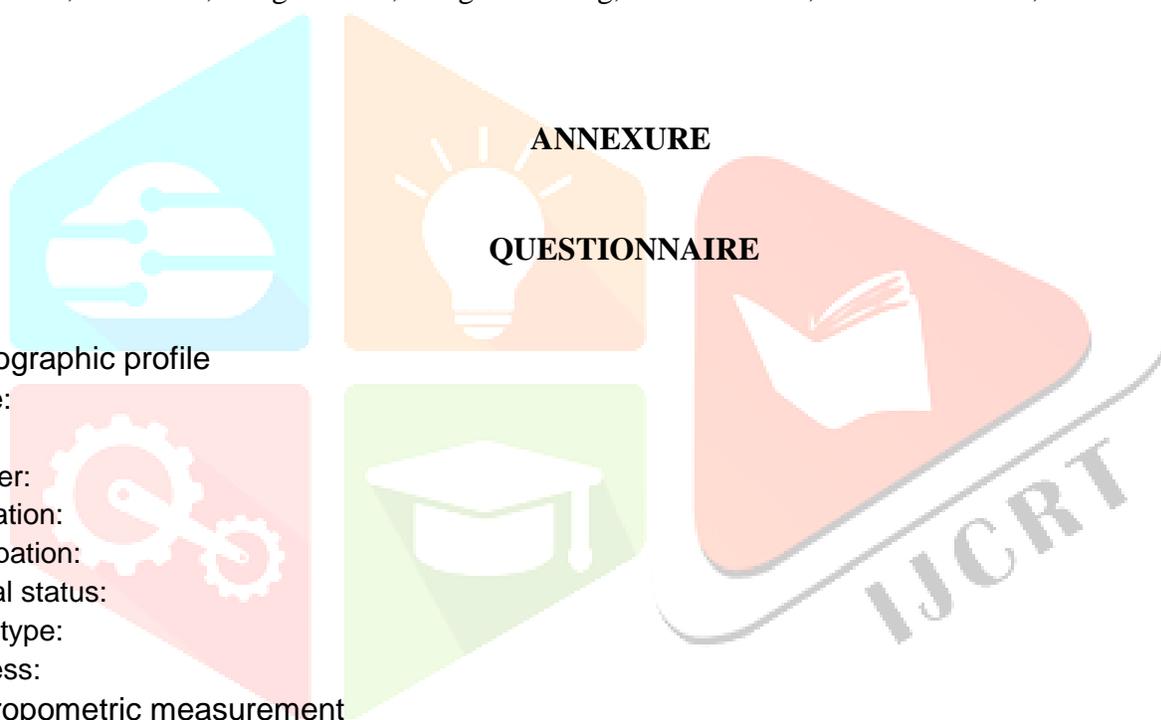
Demographic profile
Name:
Age:
Gender:
Education:
Occupation:
Marital status:
Food type:
Address:
Anthropometric measurement

1. Height

2. Weight

3. BMI

Pittsburgh Sleep Quality Index(PSQI)

Instructions: The following questions relate to your usual sleep habits during the past month only your answers should indicate the most accurate reply for the majority of days and nights in the past month. Please answer all questions.
1. During the past month, what time have you usually gone to bed at night?
2. During the past month, how long(in minutes) has it usually taken you to fall asleep each night?
3. During the past month, what times have you usually gotten up in the morning?
4. During the past month, how many hours of actual sleep did you get at night?(This may be different than the number of hours you spent in bed).

5. During the past month, how often have had you had trouble sleeping because you…	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
a. Cannot get to sleep within 30 minutes				
b. Wake up in the middle of the night or early morning				
c. Have to get up to use the bathroom				
d. Cannot breathe comfortably				
e.Cough or snore loudly				
f. Feel too cold				
g. Feel too hot				
h. Have bad dreams				
I. Have pain				
j. Other reason(s), please describe:				
6. During the past month, how often have you taken medicine to help you sleep(prescribed or "over the counter")?				
7. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?				
	No problem at all	Only a very slight problem	Somewhat of a problem	A very big problem
8. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?				
	Very good	Fairly good	Fairly bad	Very bad
9. During the past month. How would you rate your sleep quality overall?				

	No bed partner or roommate	Partner/room mate in other room	Partner in same room but not same bed	Partner in same bed
10. Do you have a bed partner or room mate?				
	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
If you have a room mate or bed partner, ask him/her how often in the past month you have had:				
a. Loud snoring				
b. Long pauses between breaths while asleep				
c. Legs twitching or jerking while you sleep				
d. Episodes of disorientation or confusion during sleep				
e. Other restlessness while you sleep, please describe:				

Scoring the PSQI

The order of the PSQI items has been modified from the original order in order to fit the first 9 items (which are the only items that contribute to the total score) on a single page. Item 10, which is the second page of the scale, does not contribute to the PSQI score.

In scoring the PSQI, seven component scores are derived, each scored 0 (no difficulty) to 3 (severe difficulty). The component scores are summed to produce a global score (range 0 to 21). Higher scores indicate worse sleep quality.

Component 1: Subjective sleep quality—question 9

Response to Q9	Component 1 score
Very good	0
Fairly good	1
Fairly bad	2
Very bad	3

Component 1 score:_____

Component 2: Sleep latency—questions 2 and 5a

Response to Q2	Component 2/Q2 subscore
< 15 minutes	0
16-30 minutes	1
31-60 minutes	2
> 60 minutes	3

Response to Q5a	Component 2/Q5a subscore
Not during past month	0
Less than once a week	1
Once or twice a week	2
Three or more times a week	3

Sum of Q2 and Q5a subscores	Component 2 score
0	0
1-2	1
3-4	2
5-6	3

Component 2 score:_____

Component 3: Sleep duration—question 4

Response to Q4	Component 3 score
> 7 hours	0
6-7 hours	1
5-6 hours	2
< 5 hours	3

Component 3 score:_____

Component 4: Sleep efficiency—questions 1, 3, and 4

Sleep efficiency = (# hours slept/# hours in bed) X 100%

hours slept—question 4 # hours in bed—calculated from responses to questions 1 and 3

Sleep efficiency	Component 4 score
> 85%	0
75-84%	1
65-74%	2
< 65%	3

Component 4 score:_____

Component 5: Sleep disturbance—questions 5b-5j

Questions 5b to 5j should be scored as follows:

Not during past month	0
Less than once a week	1
Once or twice a week	2
Three or more times a week	3

Sum of 5b to 5j scores	Component 5 score
0	0
1-9	1
10-18	2
19-27	3

Component 5 score:_____

Component 6: Use of sleep medication—question 6

Response to Q6	Component 6 score
Not during past month	0
Less than once a week	1
Once or twice a week	2
Three or more times a week	3

Component 6 score:_____

Component 7: Daytime dysfunction—questions 7 and 8

Response to Q7	Component 7/Q7 subscore
Not during past month	0
Less than once a week	1
Once or twice a week	2
Three or more times a week	3

Response to Q8	Component 7/Q8 subscore
No problem at all	0
Only a very slight problem	1
Somewhat of a problem	2
A very big problem	3

Sum of Q7 and Q8 subscores	Component 7 score
0	0
1-2	1
3-4	2
5-6	3

Component 7 score:_____

Global PSQI Score: Sum of seven component scores:_____

FOOD FREQUENCY QUESTIONNAIRE

Q10. Do you have any food allergy or food intolerance?

1. Yes
2. No

Q11. Do you have any diseases?

1. Yes
2. No

Q12. Have any medical record?

1. Yes
2. No

Q13. How often do you eat fast food?

1. Never

2. Once/twice a week

3. Twice a week or more

Q14. How many meals do you have per day?

1. 4-5

2. 2-3

3. Rarely

Q15. Do you have any physical exercise?

1. Yes

2. No

Q16. Do you skip meals?

1. Yes

2. No

3. Sometimes

Q17. How would you rate your diet?

1. Excellent

2. Good

3. Fair

4. Poor

Q18. How many hours do you spend in school?

1. 5-6 hours

2. 6-7 hours

3. 4-5 hours

Q19.Do you have breakfast every day?

1. Yes

2. No

Q20. Has the doctor told you might have diabetes?

1. Yes

2. No

Q21. How often do you drink coffee?

1. 2-3/day

2. Often

3. Rarely

Q22. What type of food do you usually prefer to eat?

1. Healthy
2. Fast food
3. Others

Food group	Food items	Twice a week	Thrice a week	Everyday	Rarely	Servings	Amount
Cereals,Millets & Pulses	1. Rice						
	2. Sukha Roti						
	3.Puri						
	4.White bread						
	5.Brown bread						
Milk & animal products	1. Whole milk						
	2. low-fat milk						
	3.Skimmed milk						
	4. Curd						
	5. Fish						
	6. Molluscs (hamuk)						
	7. Prawn						
	8.Meat						
	9.Fermented dry fish						
Pulses & Legumes	1. Peas						
	2.Rajma						
	3.Soyabeans						
	4.Lentils						
Vegetables	1. Mustard leave						
	2. Yam leaves						
	3.Chinese knotweed						
	4.Squash						
	5.Bitter eggplant						
	6.Bittergourd						
	7. Broccoli						
	8.Cabbage						
	9.Pumpkin leaves						
Other vegetable	1. Bamboo shoot						
	2.Cauliflower						
	3.Lady finger 4. Carrots						
	5. Potato						
	6.Yam						
	7. Banana stem 8.Brinjal						

Fruits	1.Apple						
	2.Orange						
	3.Guava						
	4.Peach						
	5.Tomato						
	6.Banana						
	7. Passion fruit						
	8. Star fruit						
	9.Indian plum						
Oil/Fats	1. Cooking oil						
	2.Ghee						
	3.Butter						
	4.Nuts						
Sugar	1.Sugar						
Baverages	1. Pepsi						
	2.Coke						
	3.Fanta						