

Nutrition related Knowledge, Attitude and Practices of ABHA workers of TPDDL, Delhi

By

L. Nandini Krishna

Under the Supervision of

Dr. J.P. Singh

Dissertation Submitted in partial fulfilment for the award of the degree of Master of Business Administration in Hospital and Health Management

Academic Year, 2019-2021



1, Prabhu Dayal Marg, Near Sanganer Airport,
Jaipur-302039, Rajasthan

Ph: 0141 3924700, Fax: 3924738

Website: www.iihmr.edu.in

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DECLARATION BY STUDENT

I hereby declare that this dissertation titled **Nutrition related Knowledge, Attitude and Practices of ABHA workers of TPDDL, Delhi** is the bonafide record of my original research work. I declare that it has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.

A rectangular box containing a handwritten signature in blue ink. The signature appears to be 'L. Nandini' with a horizontal line underneath.

L. Nandini Krishna
0925, MBA-HM 24
Date – 1 July 2021

COMPLETION CERTIFICATE

This is to certify that **L. Nandini Krishna** in partial fulfilment of the requirements for the award of the degree of **MBA Hospital and Health Management** from **IIHMR University, Jaipur** has successfully completed her internship at **Social Impact Group (SIG), TATA POWER DELHI DISTRIBUTION LIMITED (TPDDL)** during April to June 2021.

Date – 2 July 2021

Geetanjali
2/7/2021

Ms. Geetanjali Tripathi

AGM and HoG-SIG (Unnati and Club Enerji)

TATA POWER DELHI DISTRIBUTION LIMITED

CERTIFICATE

This is to certify that dissertation titled **Nutrition related Knowledge, Attitude and Practices of ABHA workers of TPDDL, Delhi** is a record of the research work undertaken by **L. Nandini Krishna** in partial fulfilment of the requirements for the award of the degree of MBA Hospital and Health Management from the IIHMR University, Jaipur under my guidance and supervision and his/her approach to the research study has been sincere, scientific, and analytical.

J.P Singh
Faculty Guide
IIHMR University, Jaipur
Date – 1 July 2021

School Dean
IIHMR University, Jaipur
Date – 1 July 2021

Abstract

Background

For a healthy life and proper growth and development, nutrition is very essential. There should be intake of all the appropriate macro as well as micro nutrients in their required amounts for the correct functioning of the body. With better nutrition, a person remains healthy. Imbalance in these amounts leads to malnutrition which could be of two forms – undernutrition and overnutrition. In a developing country like India, the dual burden of both these forms of malnutrition is faced. In households, particularly in India, it is the women who are responsible to look after the food being provided to the whole family.

Rationale

Assessing the level of knowledge, attitude and practice of the ABHA workers related to nutrition can help to understand the reasoning behind the meal choices and there might be chances of better equipping the ABHA's with appropriate knowledge so that they can serve nutritional meals for their family accordingly.

Methodology

This was a cross-sectional study carried out with 100 ABHA workers working under Tata Power Delhi Distribution Limited, in the North Delhi region, who are essentially the community representatives of the underprivileged community within the organisation's jurisdiction. These 100 ABHA's were interviewed telephonically to assess their nutrition related knowledge attitudes and practices.

Results

Majority of the respondents were observed to have somewhat knowledge and understanding of all the nutrients, as for each of the food groups more than sixty percent of them were able to identify at least one major nutrient in those. The knowledge about dietary fibres was observed to be less than half among all the participants. Only less than quarter of the respondents were unaware of the harmful consequences on

overnutrition. The attitude and practice were fairly moderate on average of all the aspects.

Conclusion

The ABHA's are also involved with many initiatives which includes awareness sessions for the women and adolescent girls in the community. Hence, it's vital to ensure that such change agents, who hold such a strong convincing power be enriched with proper knowledge on nutrition. With, strong emphasis on increasing nutrition related knowledge, and encouraging healthy attitudes, can further help in improving practice as well, and therefore reducing the burden of both forms of malnutrition in the community thus promoting well balanced nutritious and healthy lives.

Key Words

ABHA workers, nutrition, micronutrition, knowledge, awareness, attitude, practice

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Abbreviations

Acronym	Full Forms
BMI	Body Mass Index
CMC	Christian Medical College
CNNS	Comprehensive National Nutrition Survey
CSR	Corporate Social Responsibility
ICDS	Integrated Child Development Services
ICMR	Indian Council of Medical Research
IDD	Iodine Deficiency Disorders
JJ Clusters	Jhuggi Jhopdi Clusters
KAP	Knowledge Attitude Practice
NFHS	National Family Health Survey
NGO	Non-Governmental Organisation
NIN	National Institute of Nutrition
OBC	Other Backward Caste
SC	Scheduled Caste
SIG	Social Impact Group
ST	Scheduled Tribe
TPDDL	Tata Power Delhi Distribution Limited
WHO	World Health Organization
WLC	Women Literacy Centres

Chapter 1 - Introduction

Nutrition is an integral part of life and aids in development and growth of all living beings. With better nutrition, a person remains healthy. In all the phases of life, nutrition is linked be it infant health, children's health, maternal health and with improved and appropriate nutrition the risk of lifestyle diseases or non-communicable diseases is also reduced. [1]. It is basically the intake of the required amounts of solids and liquids as per the dietary recommendations so that essential nutrients and energy is absorbed and obtained respectively to the body. From the early stages of life proper diet is essential to remain active along with appropriate growth and development. [2]

Improper nutrition uptake results in malnutrition which can be categorized into two types: Undernutrition and Overnutrition. In a developing country like India, the dual burden of both these forms of malnutrition is faced. Undernutrition occurs when there is an insufficient intake of nutrients necessary for a person's good health. [3] To measure undernutrition in children three indicators are commonly used which are: weight for age, height for age and weight for height. In India 35.8% children under 5 years are underweight (low weight for age) [4]. The practice of measurement of BMI is followed for the adults. About 22.9% of women (15-49 years) have BMI below normal ($<18.5 \text{ kg/m}^2$) as per the NFHS-4 2015-16 National Fact Sheet. [4]

Specific micronutrient deficiencies are also included in undernutrition. They occur because the body does not receive the essential vitamins and minerals in their small quantities for proper growth and development. [5] And this likely increases the chance of illness due to weakened immune system and thus affecting the overall quality of life. In India, great importance is given towards Iron Deficiency, Vitamin A Deficiency and Iodine Deficiency, through the implementation of various initiatives – National Iron Plus Initiative, National Iodine Deficiency Disorders Control Programme, National Prophylaxis Programme against Nutritional Blindness due to Vitamin A Deficiency, ICDS, Mid-Day meal scheme. [6]

Vitamin A Deficiency

The inadequate intake of Vitamin A causes night blindness or visual impairment (CNNS And Unicef 2018) and according to WHO it affects one third of children globally, with an increased risk of childhood morbidity and mortality due to common

infections. [7] As per the report of CNNS the Vitamin A deficiency prevalence in children 1 to 4 years were 18%, 5 to 9 years were 22% and adolescents aged 10-19 years were 16%. [8] The cross-sectional study carried out by CMC, in the Jawadhi Hills near Vellore, Tamil Nadu in children who were of age 1-8 years and women aged 15-45 years have indicated the prevalence of Vitamin A deficiency in children to be 10.2% and the women to be 3.8%.[9]

Anaemia and Iron Deficiency

Anaemia is linked to deficiency of micronutrient iron (majorly), folic acid and Vitamin B12, and is also known as Iron deficiency Anaemia [6] and is a major public health problem in India [10].

Due to lack of iron primarily, Vitamin B12 and folate, the quantity of haemoglobin and red blood cells reduces, thus affecting the oxygen carrying capacity and hence the parts of the body do not receive ample oxygen. Anaemic persons are often tired and suffer from breathlessness and is more common in children and women of reproductive age group especially pregnant women. [11]. NFHS 4 surveys showed that 58.6 % children aged under 5 years and 53.1% women in reproductive age group are anaemic [4].

Iodine Deficiency

Iodine is one of the necessary micronutrients required for the proper functioning of the body and it's lack could cause goitre (enlargement of thyroid gland) and affecting the synthesis of thyroid hormone, which leads to functional abnormalities termed as Iodine Deficiency Disorder (IDD). [12]. In India, the population is at risk of IDD as the soil (through which iodine is derived) is deficient of iodine, but due to the production of fortified iodine salt and the goal of National Iodine Deficiency Disorders Control Programme to ensure that the household coverage of iodized salt should be to of 100%, the risk of IDD is reduced.[13]

As per the CNNS report, the urinary iodine levels in children and adolescents were in the optimum range i.e., $mUIC \geq 100 \mu g/l$ & $\leq 300 \mu g/l$. [8]. It was reported that household coverage of iodized salt in the adequate quantity at the national level was 76.3%, only 16.1% of the households consumed salt with some proportion of iodine and

7.6% of the households consumed salt with no iodine as per the study carried out by Nutrition International [14].

Vitamin D and Calcium Deficiency

Consumption of Calcium and Vitamin D is necessary for good bone health. Despite India, being a subtropical country with plentiful sunlight, 85% of the population are Vitamin D deficient. The lack of Vitamin D affects the calcium regulation in the body and that is why nutritional rickets affecting both children and adults are due to calcium deficiency and secondary vitamin deficiency [15].

The concentration of serum 25(OH) D is used to assess the levels of Vitamin D. Concentrations <12ng/dl are considered to be deficient in children under 20 years old as per the Institute of Medicine Guidelines, and it was observed that 14% of children aged 1-4 years, 18% of children aged 5-9 years and 24% of adolescents aged 10-19, Vitamin D deficient. [8]

Almost 85% of India's population is Vitamin D deficient which could be due to dietary calcium deficiency. [15]

Obesity/Overnutrition

WHO defines obesity and overnutrition as the abnormal or excessive fat accumulation which creates a risk to health and life. Body Mass Index (BMI) is used as a measure – more than 25 BMI is overweight and more than 30 BMI is accepted as obese. [16]

Obesity is one of the major risk factors for the causation of cardiovascular diseases and it is more prevalent in women as compared to men [17].

As per NFHS 4, 20.6% women (15-49 years) and 18.9% of men were obese (>25 BMI). [4] A study has predicted that the prevalence of overweight will more than double and obesity will triple by 2040 in adults of ages 20-69 years. [18]

A woman in a family is the one responsible in the household for the daily diet, she is usually the one who decides which food should be given to her children and rest of the family members, and that is why a woman should ideally know and be aware of the healthy food choices and basic nutritional facts. A women's nutritional knowledge and

awareness impacts the health and development of children as well as the household [3-5].

Conceptual Framework

At Tata Power DDL, the CSR Department (Social Impact Group) works towards empowering and community development through the initiatives under 4 pillars, namely

—

- **Unnati** – Women and Youth Empowerment
- **Sanjeevani** – Health
- **Ujjwal** – Economic upliftment of marginalized communities
- **The Club Enerji** – Climate Change

Under the Unnati pillar, women from the community are made literate through the Women Literacy Centres (WLC). Many women, after experiencing the joys of literacy, wished to contribute further, which led to the development of the **ABHA programme**. They are the women representatives who work as the brand ambassadors for the Unnati programme.

- ABHA who are termed as the change agents, are the women representatives who are tasked with helping in the implementation of the Social Innovation Programs in the JJ Clusters.
- They are the link between the community and reach out to the residents of the JJ Clusters to bring about the visibility to the community initiatives being run by the Social Impact Group – the CSR Department of Tata Power DDL.
- Since they represent the community itself and conduct awareness campaigns by going door-to-door, it's imperative that they have the basic nutritional awareness and knowledge of healthy balanced diets.

Hence, through this study, possible the understanding pertaining to their knowledge attitude and practices regarding nutrition can be determined.

Chapter 2 – Review of Literature

S.No:	Author	Title	Overview
1.	<i>Upadhyay S, Kumar AR, Raghuvanshi RS, Singh BB</i>	<i>Nutritional status and knowledge of hill women on anemia: effect of various socio-demographic factors</i>	This was a cross-sectional study which was undertaken in three villages of the Nainital district, Uttarakhand, India in 2017 to determine the nutritional knowledge on anaemia of the hill women. A random sample of 223 women were selected and they were of the age group 18-45 years. Their knowledge was assessed using scoring and it was found that the mean percent score was 23.28. And it was seen that with a rise in age the scores decreased. Nutritional anaemia knowledge in these hill women were significantly associated with their educational status. The conclusion was that the nutritional awareness was not satisfactory and more intense awareness campaigns were recommended.
2.	<i>Anand D, Puri S.</i>	<i>Nutritional knowledge, attitude, and practices among HIV-positive individuals in India.</i>	This is a study carried out in 2013 which investigated the Knowledge attitude and practice related to nutrition among 400 HIV-infected people living in Delhi, India. The nutritional knowledge among them was accepted as moderate and they also observed a positive attitude to the food and nutritional aspects. However, the practice of healthy nutrition was low with a score of 8.1 out of 15. This represented that there is lack in conversion of knowledge and attitude to practice, suggesting strong and targeted behavioural interventions.
3.	<i>Dr.Bharati.R, Dr.R.Dheeba</i>	<i>KAP study on nutritional awareness among pregnant</i>	This study was conducted in 2017 to determine the knowledge, attitude and practices

	<i>Jayanthi, Dr.R.Padmapriya</i>	<i>women in a tertiary care centre</i>	of pregnant mothers towards nutrition during their gestation in a tertiary care centre in Salem, Tamil Nadu, India. 1000 pregnant women during their antenatal care at the clinic were the sample number for the study. It was found that only 8% of the women had good knowledge, whereas 35% of the women had poor knowledge about nutrition in pregnancy. Majority of these women were unaware of the common sources of nutrition. The study recommended improved nutritional counselling in the antenatal period.
4.	<i>Gupta MC, Mehrotra M, Arora S, Saran M</i>	<i>Relation of childhood malnutrition to parental education and mothers' nutrition related KAP</i>	In this study, conducted in 1991 assessment was performed in finding a relation between childhood malnutrition to the educational status of the parents and the nutrition related KAP of the mothers. 26 severely malnourished and 26 normal children were used as the sample for the study. There was no relation between father's educational status and children's malnourishment, whereas there was an association between the mother's educational status and the children's nutritional status. The study also revealed that the mother's of comparatively healthier children had much higher KAP score on nutrition in contrast to the mothers of the malnourished children.
5.	<i>Gonmei Z, Toteja GS</i>	<i>Micronutrient status of Indian population</i>	This study is a review of the micronutrient scenario in the current times by including several national surveys and studies carried out on the same. The micronutrients studied here are – • Iron, Vitamin B12, folate and ferritin deficiency (Anaemia)

			• Vitamin A deficiency • Iodine deficiency All these deficiencies were explained in detail, along with the initiatives implemented in India to improve the status.
6.	<i>Saeidlou SN, Babaei F, Ayremlou P.. Maedica.</i>	<i>Nutritional knowledge, attitude and practice of north west households in Iran: is knowledge likely to become practice?</i>	This is a cross-sectional population study conducted in the West Azerbaijan Province in 2016, to assess the Knowledge, Attitude and Practices of the urban and rural households regarding the principles of nutrition. 455 urban and rural households were studied. It was observed that more than half of both the households knew about the roles of the food groups. The role of fruits and vegetables as source of vitamins intake had the highest frequency of 68% and 62.5% respectively. And it was recommended that more nutrition knowledge to be integrated into the household training initiatives so as to improve practice and attitude towards diet and nutrition.
7.	<i>Weerasekara PC, Withanachchi CR, Ginigaddara GA, Ploeger A.</i>	<i>Food and Nutrition-Related Knowledge, Attitudes, and Practices among Reproductive-age Women in Marginalized Areas in Sri Lanka</i>	This is a cross-sectional study of food and nutrition related KAP survey administered in 400 women of reproductive age group (18-49 years) in the marginalized areas of Sri Lanka. It was conducted from 2017 to 2019. It was observed that there is strong positive correlation between nutritional knowledge, attitude score and the BMI level. And the attitude and practices of nutrition had significant differences across area, age, family size, monthly income and educational levels. They concluded that though majority displayed positive attitude towards gaining nutritional insights, their current nutritional knowledge is poor, thus emphasizing the strong need of

			nutritional awareness measures in the marginalized communities.
8.	<i>Liu H, Xu X, Liu D, Rao Y, Reis C, Sharma M, Yuan J, Chen Y, Zhao Y.</i>	<i>Nutrition-Related Knowledge, Attitudes, and Practices (KAP) among Kindergarten Teachers in Chongqing, China</i>	As kindergarten teachers play a major role in shaping young minds, this study's objective was to assess the knowledge, attitudes and practices related to nutrition in which a structured KAP model questionnaire was used. 222 kindergarten teachers were the sample population from 19 districts and 20 counties in Chongqing, China and was conducted from 2016 to 2017. It was reported that 54.2% of the sample were familiar with basic knowledge on nutrition, and only 9.9% were said to be satisfied with their current knowledge on nutrition. 97.7% displayed a positive attitude towards receiving more knowledge. Since there were low levels of nutrition related knowledge which implied necessary training of the kindergarten teachers to improve the nutrition related knowledge.

Research Question

What is the Knowledge, Attitude and Practices of ABHA towards Nutrition?

Research Objectives –

1. To assess the knowledge and attitude related to nutrition of ABHA workers.
2. To assess the practice towards nutrition of ABHA workers.

Chapter 3 - Methodology

This descriptive cross-sectional study was conducted to assess the knowledge, attitude and practices of ABHA workers of TPDDL towards nutrition

Study Area – The study was conducted on the ABHA workers residing in JJ clusters, villages and migrant settlement colonies in the North Delhi area.

Type of Study Design - Descriptive Cross Sectional

Study Population: A total of 841 ABHA's who serve in 220+ JJ clusters to a population of about 1million in North Delhi, India.

Sampling Method - Convenience Sampling **Sample Size** – 100 ABHA's

Study Tool – Through interviews conducted telephonically. The questionnaire used for the interview was divided into 4 sections:

- Background characteristics (including the sociodemographic characteristics)
- Knowledge on basic nutrition
- Attitude related to nutrition
- Practice related to nutrition

Data Analysis

Total of 100 ABHA were interviewed and the responses were collected in 4 sections namely – Background Characteristics, Knowledge on Nutrition, Attitude on Nutrition and Practice of Nutrition. All the data through the interviews were collected from 21 May to 9 June 2021. The collected data was then entered and analyzed using Microsoft Excel. The categorical variables were then summarized in the form of proportions and tabulations. Further, graphical (pie and bar chart) analysis was performed to portray the results.

Ethical Consideration

The purpose of study was explained to the ABHA workers and informed consent was obtained from each participant. Confidentiality of information was maintained by omitting any personal identifier from the interview. All the participants were informed priorly, that this was a voluntary study and they could withdraw from their participation in the study at any stage.

Chapter 4 - Results

Section 1: Background Characteristics of the respondents

The first section consists of all the background characteristics of the respondents. A total of 12 questions were asked which included the 9 questions on sociodemographic characteristics of the participants along with 3 questions on understanding their role in preparing meals for their households. Table 1 represents all the sociodemographic characteristics of the respondents.

TABLE -1 : Sociodemographic characteristics of ABHA's		
S.NO:	Characteristic	Percentage
1	Age Group *	
	18-25	46
	26-35	39
	36-45	13
	Above 45	2
2	Religion *	
	Hindu	96
	Muslim	2
	Sikh	1
	Christian	1
3	Caste *	
	General	35
	OBC	24
	SC	40
	ST	1
4	Marriage status *	
	Yes	65
	No	35
5	Do you have children *	
	Yes	58
	No	42
5a	Number of kids (n=58)	
	1	15.5
	2	41.4
	3	29.3
	More than 3	13.7
6	Type of Family *	
	Nuclear	66
	Extended	15
	Joint	19
7	Monthly Income *	

	Upto 20k	84
	20-30k	14
	30-40k	2
8	Education level *	
	Primary (up to 5 th class)	5
	Secondary (6-10 th class)	34
	High school (11-12 th class)	38
	Graduate	21
	Postgraduate	2
9	Occupation *	
	ABHA	78
	ABHA + (others – tailoring, factory work, NGO work etc)	22
* Required Question		

The majority (forty six percent) of the ABHA's were of age group 18-25 years, thirty nine percent were of age group 26-35 years, thirteen percent of age group 36-45 and two percent of age 45 above.

In Table 1 it can be seen that ninety six percent of the respondents were Hindu; two percent were of Muslim religion and the rest one percent each were of religion Sikhism and Christianity. According to caste, forty percent of the participants belonged to Scheduled Caste, thirty five percent were of General caste, twenty four percent from Other Backward Castes and the rest (one percent) of Scheduled Tribes.

Sixty five percent of the respondents were married, and out of those fifty five percent had children. Most of these women, i.e., forty one percent had 2 children, twenty nine percent had 3 children and about fifteen percent of the respondents had only 1 child. Moreover, fourteen percent had more than 3 children.

Sixty six percent of the respondents lived in a nuclear family whereas nineteen percent lived in extended family and the rest fifteen percent lived in joint families. Eighty four percent of these respondents had monthly family income amounting up to 20,000 Rs. And only two percent had monthly earnings within 30,000 and 40,000 Rs as represented in the Table 1.

The most frequent category of education reported by the ABHA workers was high school thirty eight percent followed by secondary school thirty four percent, five percent of them had studied till primary level and only two percent had completed education till postgraduate level and it was observed from those twenty two percent of

ABHA workers had other additional occupations too like – tailoring, factory worker, NGO worker etc.

Table 2: Role in Preparation of Meals		
S.No:		Percentage
1	Responsible for cooking meals in family *	
	Yes	88
	No	12
2	Responsible in menu decision *	
	Yes	74
	No	26
3	Responsible for deciding the grocery items required *	
	Yes	76
	No	24
* Required Question		

To understand how the ABHA workers had a relation with the food being prepared in their houses, three questions were asked for that. Only twelve percent of the ABHA's did not have any role in preparing meals for their household whereas seventy four percent of the respondents were responsible in deciding the meals for their family and seventy six percent of the respondents were responsible in deciding the variety of grocery items to be brought as required.

Section 2 – Nutrition related knowledge

This section comprises of the findings determined through 11 questions asked on basic nutritional knowledge and food groups, micronutrition and overnutrition.

Table 3 represents all the correct and incorrect responses collected through the questions to assess the importance of nutrition, and the nutrients in cereals, pulses and legumes, dairy and meat products and fruits and vegetables.

Table 3: Basic Nutritional Knowledge		
S.No:	Knowledge on	Percentage
1	Importance of nutrition	
	Correct	95
	Incorrect	5
2	Nutrients in Cereals	
	Correct	61

	Incorrect	39
3	Nutrients in Pulses	
	Correct	68
	Incorrect	32
4	Nutrients in Dairy and Meat products	
	Correct	81
	Incorrect	19
5	Nutrients in Fruits and Vegetables	
	Correct	70
	Incorrect	30

The correct importance of nutrition was indicated if the respondent answered with any of these given key words - healthy living, protection from diseases, energy for physical growth and development. [2] And the correct option was selected if the respondent was able to answer at least 1 of the nutrients found in these food groups as listed in Table 4.

Table 4 – Classification of Food groups based on nutrients		
Food Groups	Major Nutrients	Other Nutrients
Cereals and Grains	Carbohydrates and fats	Proteins, Vitamin B complex, Fibre, Minerals, Calcium and Iron
Pulses	Proteins	B Complex vitamins, fibre, fat
Dairy and Meat Products	Proteins	Calcium, Iron, Iodine, Vitamins, Fat
Fruits and Vegetables	Vitamins and Minerals	Antioxidant, fibres, sugar
Source – Manual on Dietary Guidelines for Indians, NIN, ICMR, 2011 [2]		

Highest correct knowledge of ninety five percent was observed in answering the importance of nutrition. Among the food groups maximum of the respondents were able to correctly answer the nutrients in dairy and meat products (eighty one percent). Most of the incorrect responses (thirty nine percent) were identifying the nutrients in cereals and grains followed by the nutrients in pulses (thirty two percent).

In assessing the knowledge of dietary fibres as shown in figures Table 5 it was found that only forty one percent of the respondents were aware of this food group and only thirty four percent were able to correctly name even one function of the dietary fibre which includes bowel movements commonly, reduce the chances of obesity, and better energy intake. [20]

And when asked to list out the food groups it was observed that, the richest of the food group in dietary fibres is nuts and seeds (seventy eight percent), followed by vegetables (sixty five percent), fruits (forty nine percent), cereals and grains (thirty eight percent) and pulses and legumes (eight percent) as represented in Table -5.

Table 5 - Dietary fibres related knowledge			
S.No:	Knowledge on	Frequency	Percentage
1	Know about dietary fibres *		
	Yes	41	41
	Maybe	16	16
	No	43	43
2	Food's rich in dietary fibres (n=37) #		
	Fruits	18	49
	Vegetables	24	65
	Cereals and Grains	14	38
	Pulses Legumes	3	8
	Nuts and seeds	29	78
3	Function of Fibres (n=38)		
	Correct [21]	13	34
	Incorrect	25	66
* Required question # Multiple Responses possible. Total percent may add up to more than 100%			

Similarly in determining the knowledge about balanced diet, it was found that sixty three percent of the ABHA's were aware of the concept as shown in the graph and only eight percent of them were unaware.

And maximum of them, which accounted for fifty seven percent, emphasised on healthy living and low risk of disease as its major role as shown in Table 6. When given a total of 4 options, with three of them different variety of meals and fourth option on none of these most of the respondents answered that a combination of Roti, Mix Vegetable dish, Dal, Rice, Curd is the balanced meal out of the options (eighty percent), and twelve percent selected the option of Rice, Dal and Raw Cucumber and two percent perceived none of them as the response. [Table 6]

Table 6 - Balanced Diet related knowledge			
S.No:	Knowledge on	Frequency	Percentage
1	Knowledge Balanced Diet *		
	Yes	63	63
	Maybe	29	29
	No	8	8
2	Role of Balanced Diet (n=72)		
	Growth	19	26
	Energy	36	50
	Healthy no disease	55	75
3	Which of these is a well-balanced meal (n=82)		
	Roti, Green chillies, Raw Onion, Pickle	5	6
	Roti, Mix Vegetable dish, Dal, Rice, Curd	65	80
	Rice, Dal and Raw Cucumber	10	12
	None of the above	2	2
* Required question			

To assess the knowledge regarding overnutrition, 3 questions were asked on the effects of excess consumption of junk/fast foods, sweet and salty foods respectively.

It was observed, as seen in Table 7, that obesity as well as heart diseases/cardiovascular diseases, both lifestyle disease were selected to be caused by overconsumption of all these 3 items.

Looking at the individual parameters, it was found that obesity is the main effect due to consumption of junk foods (fifty four percent), diabetes is the main effect due to consumption of excessively sweet food items (eighty seven percent) and high BP and Cholesterol levels as the effect of excess consumption of salty food items (seventy five percent).

The other effects of junk food included food poisoning (forty percent), high BP and cholesterol (twenty six percent). Heart disease (fourteen percent) and tooth decay (eleven percent) were among the effects of sweet foods and bone damage/osteoporosis (ten percent) and CVD (six percent) as the other major effects of salty food consumption as seen in Table 7.

Table 7 - Knowledge on Overnutrition *				
S.No:	Harmful Consequences	Excess Junk Foods (%)	Excess Sweet meals (%)	Excess salty meals (%)
1	Obesity	54	8	3
2	Heart disease/ CVD	7	14	16
3	BP, Cholesterol raised levels	26		75
4	Liver Disease	14	1	
5	Food Poisoning	40		
6	Diabetes		87	
7	Tooth Decay		11	
8	Cancer	5		
9	Kidney disease			3
10	Bone Damage			10
11	Don't know	14	1	22
* Multiple Responses possible. Total percent may add up to more than 100%				

In the last set of questions of this section, represented in Table 8, to assess the micronutrient deficiencies, data collected through 11 questions are displayed.

The first seven of these questions dealt with the awareness of the following micronutrient deficiencies – Iron, Vitamin A, Vitamin C, Vitamin D, Folic acid, Calcium and Iodine.

It was found that the more than eighty five percent of the participants were aware of all these micronutrient deficiencies except folic acid, for whose awareness was among half of the respondents, i.e., fifty percent of the total participants.

Awareness of Calcium deficiency was the highest (ninety nine percent) followed by iodine deficiency (ninety five percent).

Rest of the four questions were on the knowledge of some diseases caused due to the above-mentioned deficiencies.

Awareness regarding bone deteriorate diseases was the highest (eighty one percent) followed by anaemia disorder (seventy three percent).

Similarly, the awareness regarding goitre disease was the lowest (fifty five percent) among the respondents, followed by night blindness (sixty five percent).

Table 8 – Micronutrient deficiency knowledge		
S.NO:		Percentage
1.	Iron Deficiency	
	Yes	92
	No	8
2.	Vitamin A Deficiency	
	Yes	87
	No	13
3.	Vitamin C Deficiency	
	Yes	91
	No	9
4.	Vitamin D Deficiency	
	Yes	89
	No	11
5.	Folic Acid	
	Yes	50
	No	50
6.	Iodine	
	Yes	95
	No	5
7.	Calcium	
	Yes	99
	No	1
8.	Anaemia	
	Yes (Iron, Vitamin B12)	73
	No	27
9.	Night Blindness	
	Yes (Vitamin A)	65
	No	35
10.	Bone Deterioration	
	Yes (Calcium, Vitamin D)	81
	No	19
11.	Goitre	
	Yes (Iodine)	55
	No	45

Section 3 – Nutrition related attitude

This section consists of all the data collected through a total of 12 questions to assess the attitude of the ABHA workers regarding nutrition. The questions along with the percentage of the responses for each is presented in Table 9. The attitude was tested using a 5-point Likert scale where the first option was strongly agreeing and the fifth option was strongly disagreeing.

As seen in Table 9, more than eighty percent of the respondents had favourable attitudes on:

1. Consumption of balanced diet keeps one healthy and reduces the risk of diseases
2. Preparation of balanced meals every day,
3. Having 3 meals a day

And the daily intake of food groups which are:

4. Cereals & grains,
5. Dairy products and
6. Fruits & vegetables
7. Pulses and Legumes

Table 9 - Attitude on Nutrition						
S. No:	Parameter	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly disagree (%)
1	Consumption of Balanced diet keeps us healthy and reduces the risk of disease	75	21	4		
2	Balanced meals should be prepared always	54	34	9	2	1
3	Having 3 meals a day is important	59	34	5	1	1
4	There will be harm in skipping meals	25	40	16	11	7
5	It's necessary to eat fruits and vegetables daily	71	27	2		
6	Its fine to munch on snacks often in a week	5	10	14	34	37
7	We should consume dairy products everyday	78	17	1	2	2
8	Its important to have cereals and grains daily	81	17	2		
9	Pulses and legumes need not to be consumed daily	22	24	9	27	18
10	Chips and biscuits should be often given as snacks	14	23	13	32	18

11	Soft drinks are to be consumed often (3-4 times a week)	5	14	11	41	29
12	You are interested and willing to know more about balanced meals and its preparation	50	39	7	3	1

Seventy five percent of the respondents strongly agree that the consumption of balanced diet keeps one healthy and reduces the risk of diseases. And fifty four percent of the respondents agree that one should prepare balanced meal always. Overall a higher frequency of agreement was observed towards the importance and consumption of balanced diet every day.

On asking about the attitude towards having 3 meals a day – Breakfast, Lunch and Dinner, it was observed that fifty nine percent of the respondents were in strong agreement and thirty four percent were in agreement, whereas twenty five percent and forty one percent were only in strong agreement and agreement respectively on the statement that there will be harm in skipping meals frequently.

It was also observed that there is an unfavorability towards consumption of snacks often at untimely periods, as thirty four percent of the ABHA workers and thirty seven percent of the ABHA workers showed strong disagreement and disagreement respectively on the statement that – It's fine to munch on snacks often in a week.

Four questions were asked to assess the attitude towards the importance of the consumption of the food groups – fruits and vegetables, dairy products, cereals & grains, pulses and legumes. For fruits and vegetables, a high inclination was observed towards their intake daily as collectively ninety eight percent of them were in agreement.

For dairy products like milk, curd, paneer, butter milk etc, also a strong approval was observed in terms of attitude, with a collective of ninety five percent in agreement.

For cereals and grains, a highly favourable attitude was observed with a total of ninety eight percent of them in agreement (eighty one percent strongly agree and twenty seven percent agree).

On been asked on the necessity of the consumption of pulses and legumes not every day, there was disapproval observed by only forty five percent which implies that more than half of the respondents were in agreement that there is no requirement for pulses and legumes to be eaten daily.

When the 2 questions were asked to determine the attitude on junk/fast food it was observed that only half of the proportion of respondents were in total disagreement towards consumption of chips and biscuits as snacks and thirty seven percent collectively were in agreement of it. But for the consumption of soft drink beverages rich in added sugar, seventy percent of the respondents showed unfavourable attitude and only nineteen percent were in favour.

Fifty percent of the respondents expressed strong agreement and thirty nine percent expressed agreement towards their interest and willingness to know and learn more about balanced meals and its preparation.

Section 4 – Practice related to nutrition

This section consists of all the data collected through a total of 8 questions to assess the practice of the ABHA workers regarding nutrition. Practice was assessed through 4 options ranging from daily – weekly – rarely – never. Table 10 depicts all eight of these parameters with respect to these 4 values.

Table 10 - Practice of Nutrition					
S. No:	Parameter (followed by family)	Daily (%)	Weekly (%)	Rarely (%)	Never (%)
1	Consumption of Balanced diet	81	18	1	
2	Consumption of fruits and vegetables	72	28		
3	Consumption of fast/junk food		26	52	22
4	Consumption of cereal and grains	97	2	1	
5	Consumption of dairy products	87	13		
6	Consumption of pulses and lentils	76	24		
7	How often do everyone eat 3 meals	82	17	1	
8	Consumption of soft drinks	12	58	30	

Findings indicate that most of the respondents daily consume balanced diet (Eighty one percent), fruits and vegetables (Seventy two percent), cereals and grains (Ninety seven percent), dairy products (Eighty seven percent) and pulses and lentils (Seventy six percent).

Twenty two percent of the respondents have never consumed junk foods while fifty two percent consume them rarely only.

Eighty two percent of the participants follow the practice of having 3 meals daily.

The percentage of weekly intake of soft drinks were fifty eight percent and rare intake was thirty percent.

Chapter 5 - Discussion

Around one fourth of the whole population of the world is tackling with the several forms of micronutrient deficiencies.[6] In the period of 2014-16, it was approximately estimated that fourteen percent of the population of India amounting to 19.7 crore Indians were undernourished as per the report of Food and Agriculture organization. [20,6] One big step on moving towards reducing undernutrition as well as obesity is increasing the awareness.

More the knowledge the population have, they have been better equipped to make well informed decisions about the nutrition they are gaining and what produce they should be consuming appropriately. Through such studies on people's knowledge, attitude and practices, a quite amount of beneficial information and insights can be gained as it may provide a different outlook and perspective on their dietary concepts and behaviours.[21]

The aim of this study was to assess the nutrition related knowledge, attitudes and practices of the ABHA workers, who are the community representatives in the JJ clusters under the jurisdiction of TPDDL. It was seen that ninety five percent were having correct knowledge about the importance of nutrition and more than half of them were also aware about the food groups except for dietary fibres, whose importance was observed at forty one percent.

The results showed that the knowledge and understanding about the role of dietary fibres was comparatively weak as compared to other nutrients which they more easily identified in the food groups. In a similar KAP study conducted in Iran [22], it was reported that in their households under study the level of knowledge was more than fifty percent. Hence, according to the findings, the respondents' level of knowledge on the basic food groups, importance and role of balanced diets was acceptable. Similarly, the knowledge of junk and fast foods was satisfactory and major of them were aware of at least of one harmful consequence. It was also observed that many were aware of the common micronutrient deficiencies, with more than half of them knew about the asked deficiency in micronutrients but they were not as much aware of the diseases associated with them.

It was found in a study done in Sri Lanka that with better education to women, they had higher knowledge of nutrition related to nutrition and with better nutritionally beneficial

practices and attitudes they had comparatively more knowledge of nutrition thus proving that knowledge, practice and attitude go hand in hand. [24] Thus, education on nutrition is required to improve further knowledge through awareness programs and initiatives and it can be said with nutrition knowledge there can be a positive change in the behaviour and dietary practices

Chapter 6 - Conclusion

The ABHA's are termed as the change agents, because they represent the community and form a bridge between the organization and the community. The ABHA's are also involved with many initiatives which includes awareness sessions for the women and adolescent girls in the community. Hence, it's vital to ensure that such change agents, who hold such a strong convincing power be enriched with proper knowledge on nutrition.

With, strong emphasis on increasing nutrition related knowledge, and encouraging healthy attitudes, can further help in improving practice as well, and therefore reducing the burden of both forms of malnutrition in the community thus promoting well balanced nutritious and healthy lives. Nutrition education can be made mandatory as part of all training programs for the ABHA workers.

Further studies can be performed in exploring the factors affecting their awareness and behavioural patterns on nutrition.

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Annexures

KAP Survey Questionnaire - Consent

Hello, I am L. Nandini Krishna, intern at TATA Power DDL Social Impact Group. I am an MBA Hospital and Health Management student from IIHMR University, Jaipur.

I have called you for the purpose of a study I am conducting to assess your knowledge, attitude and practice regarding nutrition. Your participation in this survey is entirely voluntary, and all the information asked will be kept completely confidential.

Please provide your consent for this study and it will only take 15-20 minutes of your time.

May I start the interview - Yes/ No

Section 1 – Background Characteristics

Q1. What is your age? *

Q2. What is your religion? *

- Hindu
- Muslim
- Christian
- Sikh
- Jain
- Buddhist
- Other (mention)
-

Q3. What is your caste? *

- General
- OBC
- SC
- ST

- Other (mention)

Q4. Are you married? *

– Yes or No

Q5. Do you have children? *

– Yes or No

Q6. How many children do you have? *

- One
- Two
- Three
- More than three

Q7. What kind of family do you live in? *

- Nuclear
- Extended
- Joint

Q8. What is your Monthly family Income? *

- Up to 20,000
- 20,000-30,000
- 30,000-40,000
- 40,000-50,000
- Above 50,000

Q9. You have completed education till which level? *

Q10. What is your occupation? (Anything along with ABHA to be mentioned) *

(In the next set of questions, if no please specify)

Q11. Do you cook all the meals for your household/family? *

YES/NO

Q12. Do you decide on what to be cooked for each meal? *

YES/NO

Q13. Do you decide on what all to be bought for the groceries? *

YES/NO

SECTION 2 (KNOWLEDGE)

Q1. What is Nutrition and why is it important according to you? *

- Correct
- Incorrect

Now I am going to name all basic food groups, and you have to tell me if you know about them or not?

- a) Cereals, grains and products – Rice, wheat, ragi, bajra, maize, jowar etc
Yes/No
- b) Pulses and legumes – Moong, Lobia, Masoor, Toor daal, chana, etc
Yes/No
- c) Dairy and Meat Products
Yes/No
- d) Fruits and Vegetables
Yes/No

Primary Role of the food groups (If they define the correct answer then yes)

Q2. Cereals (Energy, Carbs) *

- Correct
- Incorrect

Q3. Pulses and Legumes (Protein, energy) *

- Correct
- Incorrect

Q4. Milk and Meat Products (Protein/Fat) *

- Correct
- Incorrect

Q5. Fruits and Vegetables – (Vitamins and Minerals) *

- Correct
- Incorrect

Q6. Have you heard of or do you know about Dietary fibers? *

- Yes
- Maybe
- No

Q7. List out foods' rich in dietary fiber? (Multiple responses possible)

- Fruits
- Vegetables
- Cereals and Grains
- Pulses and Legumes
- Nuts and Seeds

- Others (Specify)

Q8. What is the function of dietary fiber in food?

- Correct
- Incorrect

Q9. Do you know about balanced diet? *

- Yes
- Maybe
- No

Q10. What is the role of balanced diet?

- Correct
- Incorrect

Q11. Which of these meals is a well-balanced meal?

- Roti, Mix Vegetable, Daal, Dahi and Rice
- Roti, hari mirch, raw onion, achaar
- Rice, Daal and raw cucumber
- None

Q12. What is the effect of eating junk foods very often? *

- Obesity
- BP, Cholesterol
- Heart Disease/CVD
- Liver Disease
- Cancer
- Food Poisoning
- Don't know
- Other (Specify)

Q13. What is the effect of high consumption of sweet foods? *

- Obesity
- BP, Cholesterol
- Heart disease
- Diabetes
- Liver Disease
- Tooth decay
- Don't know
- Others

Q14. What is the effect of high consumption of salty foods? *

- High BP, Cholesterol
- CVD
- Cancer

- Kidney disease
- Obesity
- Bone deterioration
- Don't know
- Others

Q15. Do you know about these micronutrient deficiencies? *

- Iron – Yes/No
- Vitamin A - Yes/No
- Vitamin C - Yes/No
- Vitamin D - Yes/No
- Folic Acid - Yes/No
- Iodine - Yes/No
- Calcium - Yes/No

Q16. Do you know why Anaemia occurs? *

- Yes
- No

Q17. Which vitamin deficiency causes problems in vision like night blindness? *

- Yes
- No

Q18. Which vitamin and micronutrient deficiency causes issues in bone development and maintenance? *

- Yes
- No

Q19. Goiter (enlarged thyroid gland) happens because of which deficiency? *

- Yes
- No

Section 2 – Attitude of Nutrition

(Likert scale is applied of a 5-point system ranging from Strongly Agree to Strongly Disagree)

Q1. Do you believe that if we consume balanced diet, one remains healthy and reduces the risk of disease? *

1. Strongly Agree
2. Agree
3. Neutral
4. Disagree
5. Strongly Disagree

Q2. Do you think while preparing meals, it should be ensured to be balanced? *

1. Strongly Agree
2. Agree
3. Neutral
4. Disagree
5. Strongly Disagree

Q3. Do you think 3 meals a day is important? *

1. Strongly Agree
2. Agree
3. Neutral
4. Disagree
5. Strongly Disagree

Q4. Will there be a harm in skipping meals? *

1. Strongly Agree
2. Agree
3. Neutral
4. Disagree
5. Strongly Disagree

Q5. It is it necessary to eat fruits and vegetables every day? *

1. Strongly Agree
2. Agree
3. Neutral
4. Disagree
5. Strongly Disagree

Q6. Is it fine to munch on fast foods often in a week? *

1. Strongly Agree
2. Agree
3. Neutral
4. Disagree

5. Strongly Disagree

Q7. Should we consume dairy products every day? *

1. Strongly Agree
2. Agree
3. Neutral
4. Disagree
5. Strongly Disagree

Q8. Its important to have cereals and grains in every day? *

1. Strongly Agree
2. Agree
3. Neutral
4. Disagree
5. Strongly Disagree

Q9. It's not important to have pulses and legumes daily? *

1. Strongly Agree
2. Agree
3. Neutral
4. Disagree
5. Strongly Disagree

Q10. Chips and biscuits should be given as snacks often? *

1. Strongly Agree
2. Agree
3. Neutral
4. Disagree
5. Strongly Disagree

Q11. Soda and fizzy drinks are great beverages and to be drank often? *

1. Strongly Agree
2. Agree
3. Neutral
4. Disagree
5. Strongly Disagree

Q12. Will you be willing and interested to know more about preparation of balanced meals? *

1. Strongly Agree
2. Agree
3. Neutral
4. Disagree
5. Strongly Disagree

Section 3 – Practice of Nutrition

Q1. How often do you and your family consume fast food (noodles, Momo, pizza, burger, street food)? *

- Daily
- Weekly
- Rarely
- Never

Q2. How often do you and your family consume Balanced diet? *

- Daily
- Weekly
- Rarely
- Never

Q3. How often do you and your family consume fruits and vegetables? *

- Daily
- Weekly
- Rarely
- Never

Q4. How often do you and your family consume cereals and grains? *

- Daily
- Weekly
- Rarely
- Never

Q5. How often do you and your family consume dairy products? *

- Daily
- Weekly
- Rarely
- Never

Q6. How often do you and your family consume pulses and lentils? *

- Daily
- Weekly
- Rarely
- Never

Q7. How often do you and your family eat 3 meals? *

- Daily
- Weekly
- Rarely
- Never

Q8. How often do you and your family consume soda and fizzy drinks? *

- Daily
- Weekly
- Rarely
- Never