ISSN- 0301-1216
Indian J. Prev. Soc. Med. Vol. 55, No.4, 2024

Food Habits and Nutritional Profile of Rag Pickers: A Study in Bhubaneswar Smart City, Odisha

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ABSTRACT

Background: Rag pickers, who are frequently disadvantaged and work in informal garbage collecting, suffer various health hazards as a result of their poor living circumstances, exposure to dangerous materials, and lack of access to medical treatment. Their nutrition is particularly concerning, as their socioeconomic situation frequently restricts access to balanced and healthy foods. **Objectives:** The current study intended to study the socio-economic condition and analyse the nutritional status of rag pickers, including average daily food intake and food frequency consumption patterns, in connection to their socioeconomic status. **Methodology:** This study aims to evaluate the food habits and nutritional status of 200 rag pickers in Bhubaneswar, Odisha, where the main authorized municipal solid waste management (MSW) dump is located, i.e., at the Bhuasuni site and near Sanik School, through a comprehensive dietary assessment method. The primary data were collected from rag picker households with at least one person engaged in rag picking. **Result and Discussion:** It was found that all the respondents were non-vegetarians and ate three meals per day. There was a statistically significant relationship between cereals & meat products with the income found in this study. Calorie and protein consumption were found to have a positive significant relationship with income. The average nutritional intake of both macronutrients such as calories, protein, and fat, and micronutrients such as calcium, iron, and vitamins of male and female rag pickers was found to be insufficient when compared to the RDA. The majorities of respondents, both genders, were underweight and consumed a minimal diet compared to the RDA. **Conclusion:** The study highlights the urgent need for targeted nutrition and health interventions to improve the well-being of rag pickers and address both their nutritional deficiencies. By addressing these factors, the overall quality of life and well-being of rag pickers can be significantly improved.

Key words: Rag pickers, Municipal solid waste (MSW), RDA, Micro Nutrient, Macro Nutrient, Socio economic condition

Introduction

The Rapid growth of urbanization, industrialization and economic development raise people's living standards while also contributing to the generation of large amounts of Municipal solid waste (MSW) whose management has become a major environmental challenge in India. Rag pickers played an important role in waste management in the 19th and 20th centuries, but their contributions were not recognized and were classified under unorganized sector. They are the unsung heroes of the ***Swaccha Bharat Abhiyan***. Their contribution is directly related to a country's Gross Domestic Product (GDP) growth and recycling whereas their health status influence by many factors such as economic condition, food habits and dietary intake. Food and nutrition are basic indispensable needs of human. In addition to being a crucial part of the system that delivers health care, nutrition plays a pivotal role in preserving human well-being and health. An individual's dietary status influences clinical outcomes. Essential nutrients are classified into six groups, namely lipids, carbohydrates, minerals, vitamins and water. Health and nutritional status can be assessed by ABCD method i.e., anthropometry, biochemical, clinical and dietary survey.

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Submission	24.09.2024	Revision	14.10.2024	Accepted	57.11.2024	Printing	31.12.2024

Prior Publication*: Nil*; Source of Funding: Nil*; *Conflicts of Interest*: None*, *Article #461/598

Anthropometric measurement is a highly effective approach for determining an adult's health state by measuring their height and weight and calculating their Body Mass Index (BMI). The biochemical approach is used to determine the nutritional content of bodily fluids such as blood and urine. The clinical technique employs physical indicators such as skin, mouth, gums, nails, and hair. Dietary technique is used to conduct a systematic study of an individual's, population's, and community's dietary intake utilizing several methods such as 24-hour recall method, food frequency questionnaire, weighted intake, food diary, and dietary history, among others.

Review of Literature

Rag pickers also known as "*Garbage Pickers*" have low socio-economic status and their working condition are unfavorable. The work they do is called 3-D work i.e. dirty, dangerous and demanding.[1] Informal settlements, as one of the most vulnerable urban areas, are always in unfavorable conditions in terms of various social, economic, and physical indicators.[2] The socio-economic scenario is very bad among rag pickers and they do not have enough education, training and support to do anything else.[3] Housing condition and basic amenities are very poor as most of the rag pickers live near the dumpsite area [4]. Exposure to environmental risk factors has grown rapidly since the 1970s. One of the main reasons for these contributions has been the widely shared concern about the impacts of environmental risk factors to health and QOL.[5] Waste pickers or rag pickers play essential socioeconomic and environmental scenes in cities of developing countries. Their work helps extend the lifespan of lands, conserve resources, and protect the environment. However, they face challenges such as low earnings, scarcity of materials, and health issues such as injuries, harassment, and low prices for materials with many challenges such as low earnings, scarcity of materials, and health issues such as injuries, harassment, and low prices for materials in Tanzania cities.[6] They have no knowledge of segregations of waste material. During the collection of waste also they do not use any kind of personal protective equipment(PPE) such as gloves and masks Click or tap here to enter text[7] work related health problems such as respiratory problems, eye problem, dermatological problems, injuries, general health problems (cold, cough, fever, diarrhea, dysentery), road accident, animal bite and frost also significantly high among rag pickers.[8] Musculoskeletal disorder such as lower back pain, upper back pain, knees, shoulder, neck and ankles are significantly among rag pickers.[1] As rag picking is a hazardous work and social challenges, most of the adult rag pickers are used substance abuse and some of them are involved anti-social activities as well.[9] A double burden of malnutrition including both underweight and obesity is more prevalent among rag pickers.[10, 11] Occupational health hazards among rag pickers is more prevalent and statistically significance relationship between the number of days worked at the landfill and the health conditions of the waste pickers.[12]

Objectives of the study

This study focus on the following objectives:

1. To study the socio-economic condition of the rag pickers.
2. To know the food habits and frequency of food consumption pattern of the rag pickers.
3. To assess the health and nutritional of rag pickers by using 24-hour recall method.
4. To compare the nutritional status of rag pickers with Recommended Dietary Allowances (RDA, ICMR, 2017).[14]
5. To analysis and interpret the relationship of Food intake and Macro and Micro Nutrients with Income.

Material and Methodology

The current study applied a cross-sectional design to evaluate the nutritional and health status of 200 rag pickers, 95 of whom were male and 105 of whom were female, who were between the ages of 19 to 60 years and had at least one year of experience in the field. A purposive sampling technique was used to select the rag pickers from major slum areas i.e. two dumping sites in Bhubaneswar, Odisha (Bhuasuni site and near Sanik school) were chosen. To assess the nutritional status, food frequency consumption pattern, food habits and 24-hour dietary recall method was used which include types of food, types & frequency of meal, portion size were collected during the interviews. To analyse nutritional status, several statistical tools and techniques were utilized, such as descriptive statistics, chi-square test, and coefficient co-relation approach used to determine the relationship between nutrients and socioeconomic status. This research offered

a thorough knowledge of the dietary and health difficulties encountered by rag pickers in Bhubaneswar, emphasizing the importance of targeted interventions.

Result and Discussion

Socio demographic condition of rag pickers

Table-1: General information of rag pickers.

General Information		Male (N=95)		Female (N=105)		Total (N=200)		χ^2 value
		No.	%	No.	%	No.	%	
Gender		95	47.5	105	52.5	200	100.0	
Age (yrs)	20-30	39	41.05	31	29.52	70	35.0	χ^2= 9.65*
	31-40	33	34.73	35	33.33	68	34.0	
	41-50	9	9.47	27	25.71	36	18.0	
	50 above	14	14.73	12	11.42	26	100.0	

*Significant and NS= Not Significant

It was found from the study that more percentage (52.5%) of female respondents were engaged in rag picking profession as compare to male respondents i.e., 47.5%. The results of present study also similar to the findings of socioeconomic situation of waste pickers in the Kolkata municipal area that percentage of male waste pickers were relatively less than the female rag pickers, with the ratio being almost same, i.e., 60:40. It was observed that when compared to older age groups, the percentage of young people aged between 20 to 40 years, both male and female (69%), was found to be higher. This is supported by a survey report on the socioeconomic condition of waste pickers in the Kolkata municipal area that most of the respondents were in between the age group 18-40 yrs. There was a highly statistically significant relationship between gender and age found in this study. It indicates that middle-aged female rag pickers were more engaged in this profession than older respondents. This may be due to the different physical, social and mental challenges at the early adult age such as reproductive stage, pregnancy stage, lactating stage. Some other problems such as menopause & old age-related issues etc., Female are facing different health issues throughout their age.

Monthly income of Rag Pickers:

Table-2: Monthly income of rag pickers according to gender.

Income group	Male (N=95)		Female (N=105)		Total (N=200)		χ^2 value
	No.	%	No.	%	No.	%	
Less than 3000	01	6.66	14	93.33	15	7.5	χ^2= 28.69*
3001-5000	70	44.58	87	55.41	157	78.5	
5001-7000	07	100	0	0	07	3.5	
7001-9000	12	75.0	04	25.0	16	8.0	
Above 9000	05	100	0	0	05	2.5	
Total	95	100	105	100	200	100.0	

*Significant and NS= Not Significant

Table 2 shows that majority percentage of males (44.58%) and females (55.41%) in the income range of Rs. 3001-5000 per month. It was also noted that more percentage of female had income less than or equal to Rs. 5000/- while more percentage of male had income more than Rs.5000/- per month. There is a highly statistically significant (2=28.69*) relationship between gender and monthly income of rag pickers at the 0.05 level of significant found in this study.

***Food consumption patterns of rag pickers*:** Food consumption pattern is mainly influenced by economic status, size of family, social structure, believe and attitudes. In this present study the consumption pattern of rag pickers is mainly controlled by the economic status. The economic status is considered as a primary factor determining the purchasing power of food for the family as discussed earlier while analysing the socio-economic status of rag pickers.

***Food Habit of Rag Pickers*:** The term "food habits" refers to "conscious, group-wide, and repetitive behaviours that direct individuals to choose, use, and consume particular foods or diets in response to social and cultural influences." [13]

Table-3: Food Habit of Rag Pickers

Type of Habits	Characteristics	Male (N=95)		Female (N=105)		Total (N=200)	χ2 value
		No.	%	No.	%	No.	
Food Habit	Veg	0	0.0	0	0.0	0	χ2 =1.43
	Non-Veg	9	9.5	105	100.0	114	
Meal pattern (frequency)	Two times a day	46	48.4	42	40.0	88	
	Three times a day	49	51.6	63	60.0	112	
Total		95	100.0	105	100.0	200	
Place of taking food	Home cooked	30	31.57	29	27.61	59	χ2 =0.387
	Road side Hotel	56	58.94	65	61.90	121	
	Govt. Aahar Kendra	9	9.47	11	10.47	20	
Total		95	100.0	105	100.0	200	

***Significant & NS=Not significant**

Table 3 depicts the food habits of rag pickers. It was observed that cent percent respondents both males & female were non vegetarians. Majority respondents were taking three meals per day i.e., 51.57% male and 60% female. It was also observed that the majority of them preferred to eat at roadside hotels, which may be convenient for them nature of their work and affordability. Meal pattern and place of taking food with regard to gender were found to be statically insignificant respectively in this present study.

***Food Frequency consumption pattern of rag pickers*:**

A well-balanced diet is critical for promoting health and well-being, as well as personal growth and development. Nutritional status is a thorough way of evaluating an individual's health. The meal frequency approach, an especially suited nutritional strategy, has gained popularity in analyzing dietary consumption in large population groups. Most common foods accessible are cereals, legumes, green leafy vegetables, roots and tubers, milk, meat, fruit, sugar and jaggery, and oil. The 24-hour dietary recall approach was selected over the Food Adequacy Questionnaire (FAQ) method for the rag pickers.

The Food Frequency Questionnaire (FFQ) approach looks for eating patterns that will last over time. The FFQ is often completed by the person. The questionnaire and comprehensive instructions are mailed together. In the FFQ approach, the subject is questioned about how frequently they consume particular food.

Table-4: Food frequency consumption pattern of rag pickers
(Daily - 1, Weekly - 2, Fortnight - 3, Occasionally - 4, Never - 0)

Variable (Food Stuffs)	Male (N=95) (%)					Female (N=105) (%)					Total Respon-dents
	Daily	Weekly	Fort-night	Occasi-onally	Never	Daily	Weekly	Fort-night	Occasi-onally	Never	
Cereals	95 (100)	0	0	0	0	105 (100)	0	0	0	0	200 (100)
Pulses	95 (100)	0	0	0	0	105 (100)	0	0	0	0	200 (100)
Roots & tubers	57 (60)	23 (24.21)	11 (11.57)	4 (4.21)	0	55 (52.38)	36 (34.28)	9 (8.57)	5 (4.76)	0	200 (100)
Green leafy vegetable	5 (5.26)	23 (24.21)	47 (49.47)	13 (13.68)	7 (7.36)	18 (17.14)	14 (13.33)	44 (41.90)	9 (8.57)	20 (19.04)	200 (100)
Other vegetable	24 (25.26)	7 (7.36)	41 (43.15)	17 (17.89)	6 (6.31)	21 (20.0)	11 (10.78)	48 (45.71)	19 (18.09)	6 (5.71)	200 (100)
Fruits	5 (5.26)	8 (8.42)	2 (2.10)	28 (29.47)	52 (54.73)	3 (2.85)	9 (8.57)	6 (5.71)	12 (11.42)	75 (73.52)	200 (100)
Milk & milk products	60 (63.15)	9 (9.47)	5 (5.26)	7 (7.36)	4 (4.21)	71 (67.61)	5 (4.76)	7 (6.66)	20 (19.04)	2 (1.90)	200 (100)
Meat& meat product	47 (49.47)	33 (34.73)	7 (7.36)	8 (8.42)	0	49 (46.66)	29 (27.61)	9 (8.57)	18 (17.14)	0	200 (100)
Sugar & jaggery	95 (100)	0	0	0	0	105 (100)	0	0	0	0	200 (100)
Oil and fats	95 (100)	0	0	0	0	105 (100)	0	0	0	0	200 (100)

Table 4 depicts the information on the food frequency consumption pattern of rag pickers. It was found that the daily consumption of cereals and pulses was found in cent percent male and female rag pickers. However, the daily consumption of roots and tubers was to be 60% for men and 52.38% for women respondents. Fortnightly, they consumed 41.9% to 49.47% green leafy vegetables and other vegetables, depending on gender. Since they couldn't afford it 54.7% men and 73.52% women respondents never took fruits in their diet sometimes, they got filthy apples or bananas that the fruit seller had thrown away. Milk and milk products were found to be taken every day in the form of tea but never in the direct form which was more in females (67.6%) than males (63.15%). Daily meat intake was found to be more than 45% both in male and female. It was found that rag pickers' favoured eating rice. They typically eat rice for breakfast, lunch, and dinner during all four seasons. For breakfast, the majority of them consumed puffed rice, vermicelli, leftover rice, and rice flakes etc. The results of the present study also support the findings that a monotonous diet followed by the rag pickers with a less amount of food consumed would lead to future health complications such as lifestyle disorder such as diabetes, respiratory problems, anemia etc. [14]

***Daily Food Intake of rag pickers*:** Every person's health and nutritional state are significantly influenced by their diet. An individual's eating habits vary depending on their socioeconomic situation, cultural preferences, customs, religious convictions, traditions, and geographic locations. In the most recent year, many economists have used dietary energy data to define demographic group poverty levels. The average food and dietary consumption of male and female rag pickers has been given in the current study in the table below.

Table 5 revealed the average daily food intake (g/day) by male rag pickers compared with RDA of Indian Council of Medical Research value.[15] It was found that mean actual food intake of male rag pickers for different food stuffs was less than RDA i.e. 481.14 g ± 9.96, 52.83 g ± 2.81, 21.26 g ± 2.18, 54.77 g ± 4.65, 54.6 g ±4.78,31.22 ml ±2.99,51.77 g ±6.64,32 g ±7.19,19.94 g ±3.96, 21.1 ml ±3.15 for cereals, pulses, green leafy vegetable, other vegetables, milk& milk product, meat products, fruit, and sugar & jaggery and oil respectively. The percentage of food adequacy was more for pulses 88.05% followed by meat 86.28% and cereals i.e., 80.19%. However, the percentage of adequacy for green leafy vegetables, roots and tubers ,other vegetables, milk and milk products, fruits, sugar, and jaggery, oil and fats

varied from 21.26%, 21.265, 27.3%, 10.42%, 32.0%, 36.25% and 52.75% which were also less than RD. Statistically cereals, green leafy vegetables, roots and tubers, other vegetables, milk, fruit, sugar jaggery consumption of respondents in comparisons to RDA was found to be significant found in this study, whereas pulses, meat and oil was found to be insignificant and similar findings were also observed.[14]

ICMR 2017 (The protein size of pulses shares with fleshy food 1.5 protein for male and 1 portion for female):

Table-5: Average Daily Food intake (g) by the male rag pickers compared with RDA (ICMR, 2017)

Food	Cereals (g)	Pulses (g)	Green leafy veg. (g)	Roots & tubers (g)	Other vegetables (g)	Milk (ml)	Meat (g)	Fruit (g)	Sugar/ Jaggery (g)	Oil (ml)
RDA	**600**	**60**	**100**	**200**	**200**	**300**	**60**	**100**	**55**	**40**
Mean ± SD	481.14 ±9.96	52.83 ±2.81	21.26 ±2.18	54.79 ±4.65	54.6 ±4.78	31.22 ±2.99	51.77 ±6.64	32 ±7.19	19.94 ±3.96	21.1 ±3.15
% of adequacy	80.19	88.05	21.26	21.26	27.3	10.40	86.28	32	36.25	52.75
%of deficient/ Excess	19.81	11.95	78.74	78.74	72.3	89.6	13.72	68	68	47.25
Z-value	11.93	2.55	36.11*	17.36*	30.41*	89.89*	1.23	9.45*	8.85*	6

*Significant, at NS- not significant

Table-6: Average daily food intake (g/day) by the female rag pickers compared with RDA (ICMR, 2017)[15]

Food	Cereals (g)	Pulses (g)	Green leafy veg. (g)	Roots & tubers (g)	Other vegetables (g)	Milk (ml)	Meat (g)	Fruit (g)	Sugar/ Jaggery (g)	Oil (ml)
RDA	**480**	**45**	**100**	**200**	**200**	**300**	**45**	**100**	**45**	**45**
Mean ± SD	376.57 ±24.43	40.11 ±0.81	21.33 ±2.22	54.77 ±4.82	54.31 ±4.31	31.28 ±3.17	35.94 ±2.46	31.28 ±6.5	19.52 ±4.07	21 ±3.71
% of adequacy	78.45	89.13	21.33	27.38	27.15	10.42	79.86	31.28	43.37	46.66
% of deficient/ Excess	21.55	10.87	78.67	72.62	72.85	89.58	20.14	68.72	56.63	53.34
Z-value	4.23	6.03	35.43*	30.13*	33.80*	84.76*	3.68	10.57*	6.26	6.46

*Significant, NS- Not Significant

Table-6, revealed the average daily food intake (g/day) by female rag pickers compared with RDA of Indian Council of Medical Research (ICMR, 2016) value. It was found that mean of actual food intake of male rag pickers for different food stuffs was less than RDA i.e. 376.57 g/d ± 24.43, 40.11 g/d ± 0.81, 21.33 g/d ± 2.22, 54.77 g/d ± 4.82, 54.31 g/d ±4.31, 31.28 ml/d ±3.17, 35.94 g/d±2.46, 31.28g/d ±6.5,19.52 g/d ±4.07 & 21 ml/d ±3.71 for cereals, pulses, green leafy vegetable, other vegetables, milk and milk product, meat products, fruit, and sugar and jaggery and oil respectively . The percentage of food adequacy was more for pulses 89.13% followed by meat 79.86% and cereals i.e. 78.45%. However, the percentage of adequacy for green leafy vegetables, roots and tubers, other vegetables, milk and milk products, fruits, sugar, and jaggery varied from 21.33%, 27.38%, 27.15%, 10.42%, 31.28%, 43.37%, and 46.66% respectively which was less than RDA. Statistically cereals, pulses, meat, sugar & jaggery, and oil consumption of respondents in comparison to RDA was found to be insignificant while. While green leafy vegetables, roots and tubers, other vegetables, milk & fruits consumption was found to be significant. Similar findings were also observed by Sarkar et al. [14]

Table-7: Percentage of Deficiency/Excess of actual intake of food in comparison with RDA (ICMR, 2017)

Food	Cereals (g)	Pulses (g)	Green leafy veg. (g)	Roots& tubers (g)	Other veg. (g)	Milk (ml)	Meat (g)	Fruit (g)	Sugar/ Jaggery (g)	Oil (ml)
Male N=95	19.81 (-)	11.95 (-)	78.74 (-)	78.74 (-)	72.3 (-)	89.6 (-)	13.72 (-)	68 (-)	68 (-)	47.25 (-)
Female N=105	21.55 (-)	10.87 (-)	78.67 (-)	72.62 (-)	72.85 (-)	89.58 (-)	20.14 (-)	68.72 (-)	56.63 (-)	53.34 (-)

Table 7 depicts the information of percentage of deficiency/excess of actual mean intake of food in comparison to with RDA. The percentage of deficiency in cereals, other vegetables, meat, fruits and oil was found to be more in female i.e., 21.5%, 72.85%, 20.14%, 68.72% & 53.34% respectively while the percentage of deficiency in for pulses, green leafy vegetables, roots and tubers, other vegetables, milk, and sugar was found to be more in male respondents i.e., 11.95%, 78.74%,72.3%,89.6% and 68% respectively. There was no much difference of mean deficiency of food intake between male and female respondents were found in this study and similar findings were also observed by Sarkar et. al.[14]

Nutrient intake and RDA of male rag pickers:

Table-8: Average Daily nutrient intake by the Male rag pickers compared with RDA (ICMR, 2017)

Nutrition	Calorie (kcal)	Protein (g)	Fat (g)	Calcium (g)	Iron (g)	Vitamin-C (mg)
RDA	**3940**	**60**	**40**	**600**	**17**	**40**
Mean ± SD	3158.51 ±6.4	51.17 ±1.84	23.28 ±2.08	252 ±1.68	18.81 ±2.38	18.6 ±2.24
% of adequate	80.16	85.283	58.2	42	100	46.5
% of in adequate (E/D)	19.83 (-)	14.72 (-)	41.8 (-)	58 (-)	-	-53
Z-value	121.98*	4.799*	10.92**	207**	0.761	9.5
***Significant, NS- not significant**						

Fig-1: Nutrient intake comparisons with RDA of male rag pickers

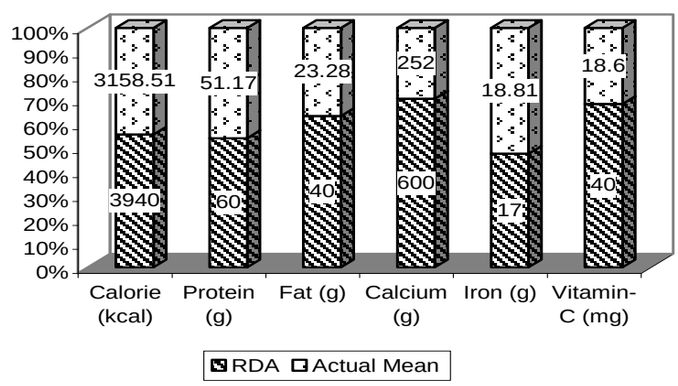

Table 8 shows the information on actual nutrient intake by the male rag pickers with RDA value of Indian Council of medical research (ICMR). It was found that mean actual nutrient intake of male rag pickers was less than RDA for all nutrient & except actual intake of iron i.e., 3158.51kcal ±6.4, 51.57 g ±1.84, 23.28 g ±2.08, 252g ±1.68 & vitamin-c 18.6 mg ±2,24 respectively. Iron intake was found to be excess i.e., 100% in comparison to RDA. The percentage of nutrient adequacy was more for protein 85.28% followed by calorie 80.16%. However, the percentage of adequacy for fat, calcium and vitamin-c varied from 42% to 58.2 % respectively. Statistically protein, iron and vitamin-c consumption of respondents in comparisons to RDA found to be insignificant in this study whereas calorie, fat and calcium consumption in comparisons to RDA were found to be statistically significant. Similar findings were also observed by Sarkar et. al. 2017.[18]

Table-9: Average Daily nutrient intake by the Female rag pickers compared with RDA (ICMR, 2017)

	Nutrition	Calorie (kcal)	Protein (g)	Fat (g)	Calcium (g)	Iron (g)	Vit.-C (mg)
	RDA	**2850**	**55**	**30**	**600**	**21**	**40**
Female N=105	Mean ±SD	2258.01±5.31	49.2 ±2.5	17.42 ±1.99	253 ±1.91	18.61±2.07	19.2±2.64
	% of adequate	79.22	89.455	58.07	42.1	88.62	48.1
	Inadequate % of (E/D)	20.77(-)	10.55(-)	41.93(-)	57.9(-)	11.4(-)	52(-)
	Z - value	111.29*	2.32	6.32	182*	1.15	7.9

***Significant, NS- Not Significant**

Fig-2: Nutrient intake comparisons with RDA of Female Rag Pickers

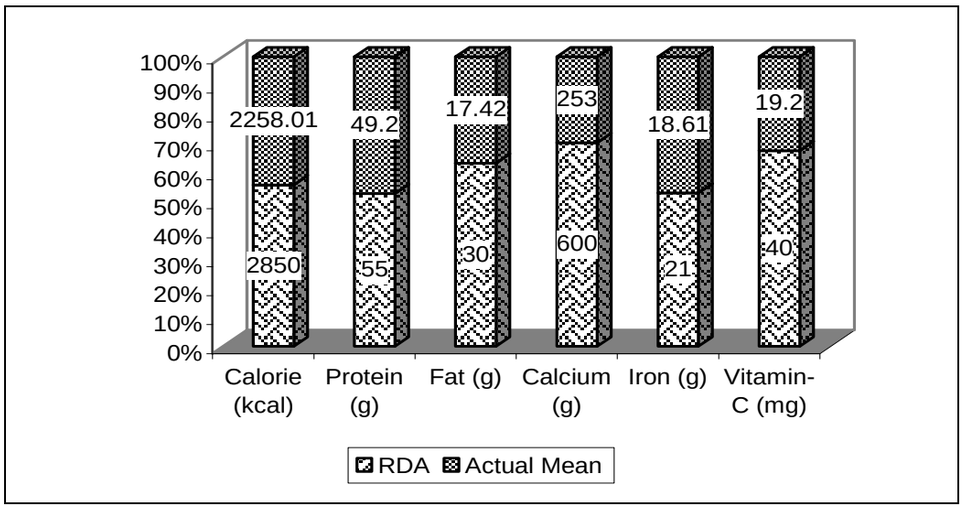

Table -9 shows the information on comparisons on actual mean nutrient intake by the female Rag Pickers in comparisons with RDA value of Indian Council of Medical Research (ICMR). It was found that mean actual nutrient intake of female rag pickers was i.e., 2258.01 kcal ±5.31; 49.2g ± 2.5; 17.42 g ±1.99; 253g± 1.91; 18,61g ± 2.07 & 19.2 mg ±2.64 for calorie, protein, fat, calcium, iron and vitamin-c respectively. The percentage of nutrient adequacy was more for protein 89.45% followed by iron 88.62% and calorie 79.22%. However, the percentage of adequacy for fat, calcium and vitamin-c varied from 42.1% to 58.07% respectively. Actual mean intake of nutrients was found deficient in comparisons to RDA in all cases. Statistically calorie and calcium consumption of respondents in comparisons to RDA found to be significant in this study whereas protein, fat iron and vitamin-c consumption in comparisons to RDA were found to be statistically insignificant.

Table-10: Percentage of deficiency /excess of mean intake of nutrient of respondents in comparison to with RDA (ICMR, 2017)

Nutrition	Calorie (kcal)	Protein (g)	Fat (g)	Calcium (g)	Iron (g)	Vitamin-C (mg)
Male (N=95)	19.83 (-)	14.72 (-)	41.8 (-)	58 (-)	-	53 (-)
Female (N=105)	20.77 (-)	10.55 (-)	41.93 (-)	57.9 (-)	11.4 (-)	52 (-)

Table 10 depicts the information of percentage of deficiency/excess of mean intake of nutrients in comparison with RDA. The percentage of deficiency in calorie, fat and iron was found to be more in female respondents i.e., 20.77%, 41.93% and 11.4% respectively while the percentage of deficiency in protein, calcium and vitamin-c was found to be more in male respondents i.e., 14.72%, 58.0% and 53.0% respectively. Iron consumption in male was found excess by 100% in comparison to RDA. It was observed from the table that there was no noticeable difference in actual mean deficiency of nutrients between male and female respondents. Similar findings were also observed by Sarkar et al 2017.[14]

***Relationship of food intake with Income*:**

The table-11 represents the relationship of various parameters of food intake with the monthly total income of Rag pickers under study.

Table-11: Relationship of Food intake with Income
(Dependent Variable: Total Monthly Income)

Parameters	Coefficients	*P-value*
Intercept	-3975.396651	0.146
Cereals	14.76418046 *	8.412
Pulses	-3.194093313	0.953
Meat products	70.6604448 *	4.751
Vegetables	-0.527789301	0.981
Others	-5.11679548	0.784
R^2	0.629271941	
F	11.54201042*	

Note: * Indicates the level of significance and 5% level is taken as threshold level here

1. * Indicates the level of significance and 5% level is taken as threshold level here
2. Others include roots, fruits, milk products, sugar, fat and oil etc

It was observed from the above table 4.71 that the consumption of cereals and meat products are found having positive and significant relationship with the income. It implies that the rag-pickers perceived that the consumption of cereals and meat products may increase their strength to work and thereby increase their income. Further the meat product and consumption cereals may be a low-cost combination of food to be affordable to low-income groups. However, they may not be aware of its negative effects in long-run which may adversely affect their health and income which can be observed in subsequent discussion.

The consumption of cereals and meat products in food intake significantly and rare and insignificant consumption of other elements of food intake like vegetables, fruits, milk and sugar etc. symbolizes the existence of poverty. It indicates that they may be deprived of in consuming these protective foods in their food intake due to their low-income profile.

Relationship of nutrients with the monthly total income-

The Table-12 represents the relationship of various parameters of macro and micro nutrients with the monthly total income of Rag pickers under study.

Table-12: Relationship of Macro and Micro Nutrients with Income
(Dependent Variable: Total Monthly Income)

Parameters		**Coefficients**	***P-value***
Intercept		-441.697	0.976
Macro Nutrients	Calorie	3.866 *	0.014
	Protein	117.3899 *	0.006
	Fat	-145.448 *	0.004
	Calcium	12.695	0.816
Micro Nutrients	Iron	-56.273	0.212
	Vitamin C	-81.891 *	0.042
	R^2	0.683	---
	F	9.438*	---

Note: * indicates the level of significance and 5% level is taken as threshold level here

It was observed from the above Table 12 that the consumption of Calorie and Protein had positive and significant relationship with the income whereas the consumption of fat was found having negative and significant relationship with income. It can be inferred from this analysis that the adequate calories intake in food and protein contains in the food may add to their strength to work and thereby adding to their income which may be an indication of improvement in their poverty ridden conditions. However as evident from earlier discussions it is learnt that the meager income of most of them may not phase required calories and protein intake in their food. However, if any policy will provide the requisite quantum of these two elements in their food they can positively add to their income and get rid of poverty. The fat was found having negative and significant relationship with the income. It can be inferred from this analysis that these two components may not be contributing towards the good health of the rig-pickers to work more and earn more income as the excess consumption of these two components in food intake may lead to many diseases and health hazards. However, the low-income profile of the rag-pickers compels them to go for the said components as their main sources of food.

The Vitamin-C was also found having negative and significant relationship with income. It indicates that the excess consumption of vitamin-c in food intake or otherwise may cause nausea, vomiting, heartburn, stomach cramps and headache etc. which will restrict them to work more and thereby earn more income. However, the low-income profile of the rag-pickers compels them to go for this component. It can thus be inferred from the above analysis that the some of the components of both the macro and micronutrients have significant impact on income determinants of rag-pickers.

Conclusion

The study on nutritional profile of rag pickers revealed a significant health and dietary challenges faced by unorganised group. The findings of the study highlighted that most of the rag pickers had diet deficient in essential micro and macro nutrients leading to widespread undernutrition malnutrition with a specific nutrient deficient. A majority of the respondents consumed calorie dense but poor nutrient foods which are limited access to balanced diets rich in proteins, vitamins and minerals.

Daily consumption of cereals, pulses, roots, tubers, sugar, jaggery, fats and oils were found by cent percent respondents. There was a statistically significant relationship between cereals & meat product with the income found in this study. The average nutritional intake both macronutrients such as calories, protein, fat and micro nutrient such as calcium, iron and vitamin-C of male and female rag pickers were found to be insufficient when compared to the RDA. Only the male respondents were consumed more iron as comparison to RDA. Calorie and protein consumption were

found to have positive significant relationship with income. During the study it was also observed that saving had negative and significant relationship with expenses made on food. Working hour per day had direct and significant impact on expenses of food

Future studies could be underscores the urgent need for targeted health and nutrition programs aimed at improving the dietary intake and overall health of rag pickers in Bhubaneswar. Interventions such as nutritional education, access to healthcare, and social welfare support can help address the nutritional gaps and health vulnerabilities of this population. By addressing these factors, the overall quality of life and well-being of rag pickers can be significantly improved.

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Citation: Pandey A, Lenka C. Food Habits and Nutritional Profile of Rag Pickers: A Study in Bhubaneswar Smart City, Odisha. Indian J Prev Soc Med, 2024; 55 (3): **275-285**.