
Nutritional Assessment and Imparting Education on Malnutrition to Adult Women and Men of Lower Income Group in Jhalana Slum of Rajasthan

Reettika Premjit ^{1*} and Damini Soni ^{2**}

*Department of Nutrition and Dietetics, NIMS Institute of Nutrition and Public Health, NIMS University, Jaipur (303121), Rajasthan, India

**Assistant Professor, Department of Nutrition and Dietetics, NIMS Institute of Nutrition and Public Health, NIMS University, Jaipur (303121), Rajasthan, India

Corresponding author: Reettika Premjit, reettika.premjit@gmail.com

ABSTRACT

Malnutrition is one of the major cause of deaths and is regarded as an important global health challenge worldwide. This study was executed with an objective to assess the nutritional status of adult men and women belonging to lower income group families by anthropometric and dietary assessment methods and to illustrate the impact of delivering nutrition education on malnutrition to the participants included in this study.

The present study was a community based cross-sectional study conducted among adult women and men (19 to 45 years) in the *Jhalana* slum of Jaipur city of Rajasthan. It was based on quasi-experimental design with pre and post testing to assess the impact of nutrition education delivered to the participants. 50 participants were selected by simple random sampling method.

Anthropometric measurements (height and weight) were used and Body Mass Index (BMI) was calculated for assessing the nutritional status of 50 participants. The prevalence of undernutrition among adult men and women were found to be 15.39% and 29.17% respectively, suggesting that the females were more undernourished. Male participants exhibited a higher prevalence of overweight than females. The prevalence of overweight of men and women were 30.46% and 20.83% respectively. Also, 4.17% women were in the category of obese class I.

The dietary assessment revealed the average mean and SD for cereals and pulses in overall 3 days was 4.66 ± 0.16 and that of fats and oils was indicated as 2 ± 0.18 which was appreciably decreased as per the daily requirements. The least consumption was noted in case of milk and dairy products along with fruits and vegetables. Thus, the dietary pattern was found to be poor. Pre-test scores reflected low knowledge regarding malnutrition among the participants with 14.8 percentage points. After delivering nutrition education, the post- test was conducted and showed remarkable improvement in the score i.e., 70.2%, a substantial change was noted in pre and post knowledge of the adult slum dwellers.

This study brings light upon the socioeconomic factors, poverty and living conditions of the slums that affects the nutritional status of slum dwellers and increases the susceptibility to malnutrition and other diseases. Nutritional interventions are the need of the hour to promote healthy lifestyle and decrease the risk of malnutrition in the economically backward areas in the country.

Keywords: Malnutrition, Nutritional status, Dietary pattern, Body Mass Index, Nutrition education, adult slum dwellers, Lower income group, Socioeconomic factors, Nutrition interventions, economically backward areas.

INTRODUCTION

Malnutrition exists in some form or another in every nation across the globe. One of the key issues in world health is the battle against malnutrition in all of its manifestations (World Health Organization, 2023). India was ranked as 107th out of 121 evaluated nations in the Global Hunger Index 2022 (GHI). India's hunger situation has been labelled as "severe" with a total score of 29.1. The most recent data indicate that India recorded the greatest child wasting rate among all GHI-covered nations. The prevalence of undernutrition increased in India from 14.6% in 2018-2020 to 16.3% in 2019-2021. Out of the 828 million people worldwide, it suggests that 224.3 million people in India are undernourished. With 19.3%, India's child wasting rate is higher than that of 2014 (15.1%) and even 2000 (17.15%).

WHO (2023) states that the major target groups affected by malnutrition include women, infants, toddlers, and teenagers. The hazards of malnutrition and its consequences are increased by poverty. The likelihood that a person may experience various kinds of malnutrition is higher in the impoverished. Malnutrition may feed a cycle of poverty and illness by raising costs for healthcare, limit the potential, and hindering economic expansion.

The Global Nutrition Report (2022) reported that globally, the nutrition catastrophe faced before the Sars Covid-19 outbreak has turned even more appalling with inclination among all forms of malnutrition. Since the Covid-19 epidemic, the number of individuals experiencing hunger had risen by 150 million, between 2019 to 2021, it raised from 618 to 768 million respectively. However, the sum of people who could not provide themselves with nutritious food amplified by 112 million, reaching 3.1 billion in 2020.

Lack of attention contributes to the slum inhabitants' daily battle with starvation and their suffering. They may even drift far behind the poor people, residing in urban areas and established a name for themselves in the city. Despite various policies undertaken by the government which includes provision of shelter near the slum area or improvement of health status, the same condition continues to resonate within Indian slums. Strong nutrition surveillance systems are required, with a focus on urban illegal colonies, in order to break this loop (Roy, 2017).

Considering the above stated views along with the condition of slums in India, this research was conducted in a slum area in order to facilitate nutrition intervention programmes and spread awareness about the pivotal role of malnutrition and ways to prevent it in the community at large.

OBJECTIVES OF THE STUDY

This study aims to assess the nutritional status of adult women and men of lower income group families by anthropometric assessment and dietary assessment methods.

It also investigated the existing knowledge among the participants on malnutrition and the impact of nutrition education delivered to the slum dwellers was examined by pre and post - test questionnaire analysis.

MATERIALS AND METHODS

Study design, area and population

The present study was a community based cross-sectional study conducted among adult women and men (19 to 45 years) in the *Jhalana* slum of Jaipur district of Rajasthan. *Jhalana* slum is located in the south-eastern part of Jaipur city. The area of study has been depicted in figure 1. It was based on quasi- experimental design with pre and post testing to assess the impact of nutrition education delivered to the participants.

Adult men and women of age group (19 to 45 years) belonging to lower income group families was selected as the sample for the present study. The total sample size of the present study was 50 adults i.e., 26 males and 24 females.

Sampling design

The sample was selected for the study using simple random sampling method.

In "simple random sampling," each member of a group has an equal probability of being selected for the sample, and any plausible sample of a particular size also has an equal chance of being chosen. This is the most fundamental sampling technique (West, 2016).

Data collection technique and tools

Development and validation of research tool

After thoroughly analysing the literature review, a semi-structured questionnaire schedule was created, and the research guide provided insight and content validity.

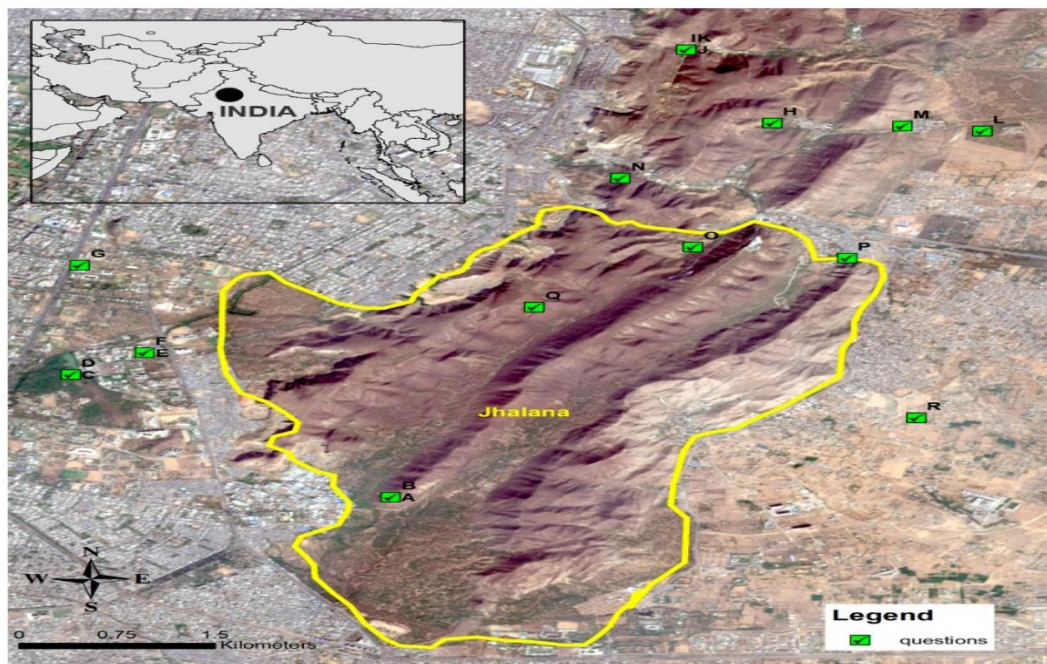


Figure 1 Study area - *Jhalana* slum

The nutritional package on malnutrition was created in the regional language for better understanding and it included audio visual aids such as illustrative charts and posters. The content was validated by the research guide before implementing the tools for the study. The development steps of research tool have been demonstrated in figure 2.



Figure 2 Development of research tool

Assessment of nutritional status

At first, rapport was built with the participants and general information was gathered such as age, gender, occupation, qualification, family income, water availability etc.

Nutritional assessment was performed using anthropometric and dietary survey method using standard protocols. Height (cm) and weight (kg) of all the 50 participants was measured accurately using standardised techniques.

Anthropometric assessment was performed by calculating BMI (Body Mass Index) for all the 50 respondents of the study. Three- days dietary recall was recorded in a standard form to assess the dietary pattern of the subjects of the study. Knowledge regarding the dietary consumption pattern was examined. Figure 3 illustrates the height and weight measurements collected for anthropometric assessment of the participants of the present study.



Figure 3 Anthropometric measurements

Nutrition education

Nutritional education regarding malnutrition was provided to the 50 members included in the study. The package comprised of the definition, types, symptoms, causes, treatment and prevention of malnutrition.

The nutrition education was delivered to all the participants of study in 4 consecutive sessions in group of 15 members for 3-4 weeks carried out in February, 2023. The duration of each educational session was 1.5 hours with a break of 10 minutes in between. The nutrition sessions on malnutrition conducted for the selected sample has been shown in figure 4 below.



Figure 4 Conduction of nutrition education sessions

Pre and post-test assessment

Figure 5 illustrates the conduction of pre and post-test assessment of the research participants. After imparting nutritional education to all the members of the study, post-test assessment was conducted after 2 weeks in the month of April, 2023 to gain insight of the knowledge gained by the participants about malnutrition.

Pre and post-test results was analysed and evaluated, using appropriate statistical techniques to assess the effectiveness of the nutrition education provided to the members of the study.



Figure 5 Conduction of pre and post-test assessment

Statistical analysis

The data collected by the participants was analysed by using appropriate statistical tools. Data was gathered, codes were assigned to each category independently, analysis was carried out suitably using various measures, and tables, graphs, and charts, respectively, were displayed. The data was analysed using Microsoft Excel and tabulated in Microsoft Word including the selected parameters of the research.

RESULTS

General Information

In this study, 50 candidates were studied out of which 26 were male participants and 24 were female participants.

The majority of the subjects (28%) belonged to the age group of 35-40 years whereas, the lowest number (4%) was found to be in 20-25 years age. In sample population, married adults were found to be dominant (92%), remaining 4% were widow and 4% were unmarried.

The educational level of the subjects was found to be poor with around half of the adults (46%) as uneducated, (26%) attended secondary school and merely (2%) graduated from college.

The findings imply that the majority of females, roughly 75% were discovered to be jobless owing to a lack of education. The remaining around 25% females were engaged in making bangles at home. The occupation seen more prominent among the male adults was seen in the private sector and 34.62%. Males who were employed as labourers were 34.61% and 23.07% were self-employed. The least number of male candidates i.e., 3.85% in both worked as local vendors and studied in college as undergraduate student.

The statistical findings depicted that 62% of the individuals relied on their own income, as compared to 38% subjects depended on their families for financial assistance. The results suggested that the majority of participants (32%) had a family income of Rs 8000-10000 per month, and around 12% of the total 50 candidates included in this research earned a family income of Rs 4000-6000 per month. This was not satisfactory to fulfil the basic needs of the family.

The detailed description of general information gathered from the participants of the present study has been summarized in Table 1.

Background Characteristics

The data collected clearly depicted that the major portion (90%) of the sample population stayed in nuclear families whereas, 10% resided as joint families. The figures suggested that majority of the candidates were Hindus (64%) and remaining 36% were Muslims. The housing material used in 62% of the houses of subjects was brick stone wall with tin roof and nearly 2% of the houses were constructed with brick /stone wall with thatch roof.

The land and houses of the studied adults were mostly (60%) owned by themselves as compared to the 40% who stayed on rent.

It is evident from the statistics, that 80% of the subjects lacked space for a kitchen in their houses while, only 20% of them stayed in a house which had provision for a separate kitchen for cooking food.

The results indicated that nearly 84% of the adults gave a positive response of being able to procure drinking water on a daily basis. The other remaining 16% adults suggested that the availability of drinking water was once in 2 days in their houses.

It was found that 50% of the adults shared one common toilet for two houses. On the contrary the remaining, 50% of individuals had a separate toilet in their houses. The results demonstrated that the government hospital was the only available medical service in close proximity to the slum area of *Jhalana* in Jaipur city.

The background characteristics describing all the parameters analysed of the studied population has been enlisted in the Table 2.

Table 1 General information of the studied population

Parameters	Frequency (n=50)		Percentage (%)	
1. Age (in years)				
20-25	02		4	
25-30	11		22	
30-35	11		22	
35-40	14		28	
40-45	12		24	
2. Gender				
Males	26		52	
Females	24		48	
3. Marital Status				
Unmarried	02		4	
Married	46		92	
Widow	02		4	
4. Educational Qualification				
Uneducated	23		46	
Primary school	11		22	
Secondary school	13		26	
Higher Secondary school	01		2	
College student (UG)	01		2	
Graduate	01		2	
5. Occupation	Male (n)	Female(n)	Male (n)	Female (%)
Labourer	09	00	34.61	0
Bangle maker	06	06	23.07	25
Private sector	09	00	34.62	0
Local vendors	01	00	3.85	0
Student	01	00	3.85	0
Unemployed	00	18	0	18
6. Source of income				
Self	31		62	
Family	19		38	
7. Alternate source of income				
Yes	0		0	
No	50		100	
8. Family income per month				
4000-6000	06		12	
7000-8000	03		6	
8000-10000	16		32	
10000-12000	13		26	
12000-15000	12		24	
9. Debts or loan from bank				
Yes	05		10	
No	45		90	

Table 2 Background characteristics of the participants

Parameters	Frequency (n=50)	Percentage (%)
1. Type of family		
Joint	05	10
Nuclear	45	90
2. Religion		
Hindu	32	64
Muslim	18	36
3. Ownership of land and house		
Owned	30	60
Not owned	20	40
4. Type of housing material		
Brick / Stone wall + thatch roof	01	02
Mud / Tile wall + Asbestos & Tin roof	01	02
Brick Stone Wall + Tin roof	31	62
Brick / Stone Wall + RCC	17	34
5. Separate kitchen in house		
Present	10	20
Absent	40	80
6. Availability of drinking water		
Daily	42	84
Once in 2 days	08	16
7. Toilet facilities		
Absent	00	0
Common for two houses	25	50
Separate	25	50
8. Medical facilities		
Government hospitals	50	100
Clinics	00	00
Private hospitals	00	00

Anthropometric Characteristics

Anthropometric measurements used for 50 adults of the study were height(m) and weight (kg) and BMI was calculated using the data gathered.

The mean and standard deviation formulated for the height of the adult slum dwellers of this study was observed as 1.65 ± 0.14 m in total 26 males included in this study and 1.60 ± 0.17 m was revealed in case of total 24 females.

The mean and standard deviation of the weight calculated for total 26 male participants was found to be 60.86 ± 10.25 kg and in the total 24 female participants was indicated as 55.92 ± 13.17 kg.

The mean and SD of height and weight observed in male and female participants has been depicted in Table 3.

Nutritional status by Body Mass Index (BMI)

The nutritional profile of the slum dwellers has been assessed by calculating BMI of all the participants and categorised according to the WHO classification (2000).

Table 3 Height and weight of adults

Parameter	Mean ± SD	
	Males	Females
Height (m)	1.65 ± 0.14	1.60 ± 0.17
Weight (kg)	60.86 ± 10.25	55.92 ± 13.17

WHO (2021) states that Body mass index (BMI) is a simple method of weight in relation to height that is frequently used to categorize adult overweight and obesity. It is determined by dividing the individual's weight in kilograms by the square of his or her height in metres (kg/m²).

The BMI was calculated using the formula:

$$\text{BMI} = \text{weight (kg)} / \text{height (m}^2\text{)}$$

The results from figure 6, revealed that 15.39% of males were underweight whereas, 38.46% were overweight and the remaining 46.15% of men were in the normal BMI range.

On the contrary, the results of female adults suggested that 29.17% of women were underweight while, 20.83% women were observed as overweight, 4.17% women were in the category of obese class I and the rest 45.83% of women possessed normal BMI.

The assessment of nutritional status by calculating the BMI of the studied population has been discussed in the Table 4.

Table 4 Assessment of nutritional status using BMI

BMI	Frequency (n)		Percentage (%)	
	Male	Female	Male	Female
Underweight (<18.5)	04	07	15.39	29.17
Normal (18.5-24.9)	12	11	46.15	45.83
Overweight (25.0-29.9)	10	05	38.46	20.83
Obese Class I (30.0-34.9)	–	01	–	4.17

The pictorial representation of the assessment of nutritional status using BMI represented in Table 4 has been depicted in figure 6.

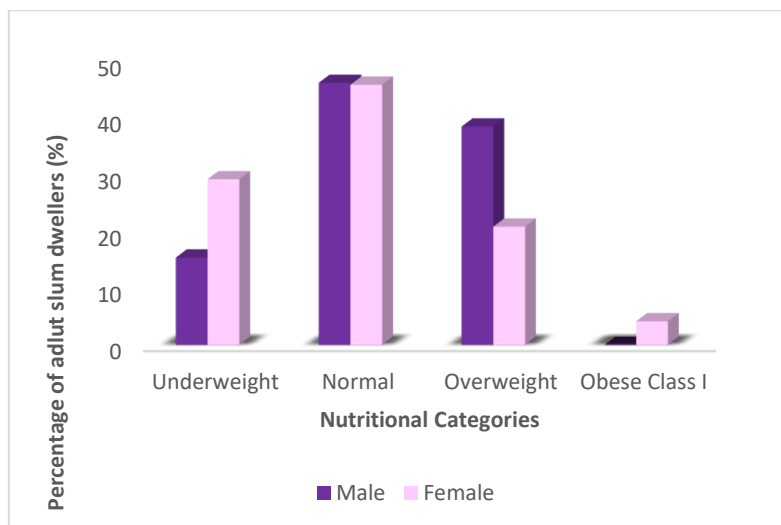


Figure 6 Nutritional assessment of slum dwellers using BMI

Nutritional assessment using three-days dietary recall

The three-day dietary recall was recorded using a pre- standardised questionnaire for all the 50 participants of this study.

The analysis revealed that most of the families could barely afford to have meals twice a day. The mean calculated for cereals and pulses were recorded as 4.58, 4.84 and 4.56 servings for the 3 subsequent days.

The average mean and SD for cereals and pulses consumed for all 3 days was observed as 4.66 ± 0.16 . The mean serving size obtained for fruits and vegetables were 1.71, 1.46, 1.51 for 3 subsequent days. The average mean and SD calculated for fruits and vegetables was 1.56 ± 0.13 .

The mean serving size of milk and milk products procured from the data was found to be 1.49, 1.42 and 1.39 for 3 consecutive days. The average mean and SD for milk and milk products was observed as 1.43 ± 0.05 .

The mean calculated for fats and oils was revealed as 2.18, 2 and 1.82 servings for 3 consecutive days. The average mean and SD for fats and oils was indicated as 2 ± 0.18 . The mean serving size procured for meat and poultry was found to be 1 serving each for 3 subsequent sizes. The average mean and SD for meat and poultry was demonstrated as 1.

The diet mainly consisted of carbohydrates and lacked protein, essential vitamins and minerals.

The mean, average mean and SD has been demonstrated in the Table 5 for different food categories included in the assessment of 3-days dietary recall.

Table 5 Mean, Average Mean and SD of overall 3-day dietary assessment

Food Categories	Day 1 (Mean)	Day 2 (Mean)	Day 3 (Mean)	Average mean and SD of 3 days
Cereals and pulses	4.58	4.84	4.56	4.66 ± 0.16
Fruits and vegetables	1.71	1.46	1.51	1.56 ± 0.13
Milk and milk products	1.49	1.42	1.39	1.43 ± 0.05
Fats and oils	2.18	2.00	1.82	2.00 ± 0.18
Meat and poultry	1.00	1.00	1.00	1.00

Pre-and Post-test analysis

The knowledge gained by the participants' regarding malnutrition was examined using pre and post knowledge test questionnaire pre- designed for the participants of the study.

The pre – test evaluation revealed that merely 74 total correct responses were obtained which was 14.8 percentage points.

After delivering nutrition education, post – test evaluation was conducted which suggested that the total correct responses were procured that accounted for 70.2 percentage points. The significant improvement in the post test score with an increase of 55.4 % demonstrated that the efficiency of nutrition education was constructive and aided in the knowledge gained by the participants.

The findings also revealed that the nutritional package was effective in facilitating the knowledge regarding malnutrition to the subjects of this study. The evaluation of the scores of pre and post-test has been described in Table 6.

Table 6 Evaluation of pre and post-test assessment

Knowledge analysis	Total Correct responses	Overall percentage (%)
PRE – TEST SCORES	74	14.8
POST – TEST SCORES	351	70.2

DISCUSSION

This study reflected that nearly half of the participants (46%) were unemployed conducted in *Jhalana* slum of Rajasthan. Kumar et al. (2021); Das et al. (2020); Sethi et al. (2020) and Akhade et al. (2019) also demonstrated the educational qualification of the adult subjects included in their analysis and presented with similar results in their studies.

In this study anthropometric measurements included height, weight and BMI that were used to examine the nutritional status of the participants. Majumder (2022); Geetha et al. (2021); Das et al. (2020) and Akadhe et al. (2019) also assessed the nutritional status by using anthropometric assessments and calculated BMI among the adult rural population and presented with similar results in their studies.

This study assessed the dietary pattern of subjects using three- days dietary recall method. Also, it was found that the diet of the subjects mainly consisted of carbohydrates and lacked protein, essential vitamins and minerals. Majumder (2022); Surve et al. (2022); Sethi et al. (2020) and Sabud et al. (2020) conducted studies to assess the dietary intake of adult participants and quoted similar results in their studies.

The Pre-test findings of this study showed a score of 8%, but post-test results showed an improvement of 80%, or an increase of 72% in the scores. Bhattacharyya et al. (2021); Kargbo (2020) and Pavithra et al. (2019) also studied the efficacy of nutrition education related to the causes of malnutrition among adult age group and suggested similar results in their studies.

The results of this study suggested that the pre and post-test scores were 18% and 50% respectively among the adult slum dwellers regarding the treatment options of malnutrition. Surve et al. (2022); Santhiya (2019) and Pavithra et al. (2019) evaluated the impact of nutrition education regarding the treatment of malnutrition among adults and arrived at similar results in their studies.

The outcomes obtained from pre- and post-test evaluations about the participants' awareness of the prevention of malnutrition, were determined as 18% and 72%, respectively. Kargbo (2020); Santhiya (2019) and Edith and Priya (2016) also studied the knowledge relevant to prevention of malnutrition among adults and demonstrated similar results in their studies.

CONCLUSION

The present study showed that 46% of the sample population were uneducated and the main occupation seen in the *Jhalana* slum among the males was found to be as labourers and factory workers. The anthropometric measurements suggested that the height and weight of the adult slum dwellers was found to be 1.65 ± 0.14 m and 60.86 ± 10.25 kg in males and 1.60 ± 0.17 m and 55.92 ± 13.17 kg was revealed in case of females.

The prevalence of undernutrition among female and male adults was 29.17% and 15.39% respectively. The manifestation of overnutrition found among the participants was 20.83% in females and 38.46% in males. The female adults who were in the category of obese class I was determined as 4.17%. Thus, the results reflected that studied population were correlation of undernutrition and overnutrition termed as the double burden of malnutrition.

The findings regarding the dietary pattern followed by the subjects of this study assessed using three-days dietary recall was demonstrated as average mean and SD of the serving sizes for milk and milk products was observed as 1.43 ± 0.05 , which is appreciably low. The average mean and SD calculated for the serving size of fruits and vegetables was determined as 1.56 ± 0.13 . Therefore, the diet followed by the subjects mainly consisted of carbohydrates and lacked protein, essential vitamins and minerals.

The pre – test evaluation revealed that merely 74 total correct responses were obtained which was 14.8 percentage points. After delivering nutrition education to the participants, post – test evaluation was conducted which suggested that the total correct responses were procured that accounted for 70.2 percentage points. The significant improvement in the post test score with an increase of 55.4 % demonstrated that the efficiency of nutrition education was constructive and aided in the knowledge gained by the participants.

The findings also revealed that the nutritional package was effective in facilitating the knowledge regarding malnutrition to the subjects of this study.

This study concludes that the socioeconomic factors, poverty and living conditions of the slums affects the lifestyle of the slum dwelling and poses an adverse effect on the nutritional status of the individuals. Nutritional interventions are the need of the hour to enhance and evaluate the nutritional well-being and facilitate in transforming the health of the individuals.

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