Nutritional Status of Children Among the Age Group of 3-5-Year-Old in the Urban Slums of Delhi

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ABSTRACT

Background - In India, 14% of the population is undernourished, according to 'The State of Food Security and Nutrition in the World, 2020 report. Further, the Covid-19 situation has increased the risk of a child's nutrition. With the disruption of Anganwadi services and the Mid-Day Meal (MDM)service delivery system, a large number of children don't have access to regular, nutritious meals. The overburdening of health systems has impaired service delivery of captious health and nutrition interventions for children. Subsequently, the economic impact of the pandemic has reduced the frequency and quality of meals consumed by households.

Methodology- A cross-sectional study is conducted in the slums of the southern region of Delhi involving the children of the age group of 3-5-year-old. Multistage random sampling is done where sampling size is calculated according to the prevalence of malnutrition of 20%. Calculated by formula 4PQ/L2 P=prevalence of malnutrition (taking like 20%), Q= 100-P, L= Allowable error (5%)=4*20*80/5*5=256 children. Inclusion criteria for the children are those who are within the age group of 3-5-year-old and are present at the time of the household visit and are not seriously ill. Exclusion criteria for the children are those who are below 3 years of age and the children with chronic morbidity and suffering from a serious illness. Those families not giving consent. Children in the age group of more than 5 years. Children having cerebral palsy, congenital malformation, HIV infection or any other excluded.

Result - Malnutrition is highly prevalent in the study population of the urban slums of Delhi. In the form of both acute and chronic malnutrition. Out of 256 children, 34 per cent of the children are severely underweight, 16 percentage of the children are severely stunted and 24.6 percentage of the children are severely acutely malnourished. 21.1 percentage of the children come in the category of moderately underweight,28.1 percentage of the children comes in the category of stunted,30.5 percentage of the children comes in the category of moderately acute malnourished.

Keywords: Malnutrition, Nutritional status of children, urban slums of Delhi

INTRODUCTION

The most significant time for a child's nutritional requirement is the first 1000 days of life through pregnancy and infancy. Poor nutrition during this phase of time can leave a child with lifelong physical and mental impairment. Therefore, investing in child nutrition is the key step to secure the country's future generation. [2]

India is one of the world's biggest makers of milk and pulses and positions as the second-biggest maker of rice, wheat, sugarcane, groundnut, vegetables, natural products, and cotton, according to the Food and Agriculture Organization of the United Nations (FAO). Notwithstanding the status, 14% of India's population is undernourished, according to 'The State of

Food Security and Nutrition in the World, 2020 report. The report states 189.2 million individuals are undernourished in India and 34.7 percent of the children aged under five in India are stunted. It further reports that 20% of India's children younger than 5 experience the ill effects of wasting, which means their weight is excessively low for their stature. [3]

In fact, from all across the world India has the most number of malnourished children. We get a reasonable image of this when we think about the dietary status of India in the National Family Health Survey 2015-2016 to the past version of the study, the level of kids who are anaemic has decreased from 69.4 per cent in the country, however, it actually remains at 58.6 per cent. The number of children under 5 years who are severely wasted has increased from 6.4 per cent to 7.5 per cent, and children stunting which was recently set apart as 48% stands at a soaring 38.4 per cent even today! [4]

Rationale
According to National Family Health Survey 4, Delhi is having 31.9% of children under 5 who are stunted (height for age), 51.9% wasted (weight for height) and 27 % children are under weight (weight for age) but there is no any specification about various population group according to the socio economic conditions of the children's [5] Slum children's are most vulnerable group of population among the urban group and even poorer than rural average as they are often left out. Further, due to the Covid-19 situation it has increased the risk of child's nutrition. With the disruption of Anganwadi services and Mid-Day Meal (MDM)service delivery system, a large number of children don't have access to regular, nutritious meals. The overburdening of health systems has impaired service delivery of captious health and nutrition interventions for children. Subsequently, the economic impact of the pandemic has reduced the frequency and quality of meals consumed by households. [6] There is not much studies done in the nutritional aspect of children's staying in the Urban slums among the age group of 3-5 years old as it is the most crucial years to check child's growth and progression.

REVIEW OF LITERATURE
Almost half of the world population are affected by mother and child undernutrition and micronutrient deficiencies. Which includes the low birth weight, intra uterine growth restriction, micronutrient deficiencies and chromic energy deficit of women. The rates of chronic protein-energy malnutrition or stunted children are much higher in Asia. [11]

India alone has more than 61 million stunted children (low stature for age), 47 million underweight children (low weight for age) and 25 million wasted children (weight for height). Appraisals from the National Family and Health Survey (2015–16) shows that about 38% of the children younger than five years are stunted (low height for age), 36% of the children are underweight (low weight for age), and 18% children are wasted (weight for height). [16]

The most common micronutrient insufficiencies include those of iron, iodine, nutrient A, and zinc. These conditions are responsible directly or indirectly for over half of all under-5 deaths around the world. Recent estimates show IUGR, stunting and serious wasting are responsible for 33% of under-5 mortalities. About 12% of death among children of the age group of under 5 children are due to the deficiency of the four normal micronutrient deficiencies. [15]

Malnutrition is brought about by a few interlinked factors and has both short and long term effects on health. It influences the cognitive and physical improvement of children, expands the danger of diseases and altogether adds to the child's morbidity and mortality. Stunting, wasting and underweight are the three most common perceived indicators of a child's nutritional status. Stunting and wasting demonstrates the chronic and acute malnutrition in children and underweight is a composite pointer that includes both acute (wasting)

and chronic(stunting) malnutrition. However, various types of malnutrition can likewise happen at the same time in children. [14]

Even after much progression in different disciplines and unmatched improvement in many health indicators constantly high malnourished children is a major point of concern.

Multiple factors can be involved in child nutrition. The most common determinants include socioeconomic inequalities, geographical differences, suboptimal feeding practices, household food insecurity, maternal literacy and childhood morbidities.

Morbidity and mortality rates have received their due attention in recent years across the world due to socioeconomic differences. Poverty is the chief determinant of malnutrition in developing countries as per several studies. Which leads to poor nutritional status among children and prevent social improvement and equity. One of the most important indicators of a household's living standard and child survival is the nutritional status of children under 5 years old. Many studies show that there is a series of connections shared with the socioeconomic status of a household related to the child's nutrition. [12,13]

Author	Country	Type of source	Summary points
Ahmed T, Hossain M, Sanin KI.	Bangladesh	Research paper	Recent estimates show IUGR, stunting and serious wasting are responsible for 33% of under-5 mortalities. About 12% of death among children of the age group of under 5 children are due to the deficiency of the four normal micronutrient deficiencies
Khan S, Zaheer S, Safdar NF.	Pakistan	Research paper	Malnutrition is brought about by a few interlinked factors and has both short and long term effects on health. It influences the cognitive and physical improvement of children, expands the danger of diseases and altogether adds to the child's morbidity and mortality
Kanjilal B, Mazumdar PG, Mukherjee M, Rahman MH	India	Research Paper	One of the most important indicators of a household's living standard and child survival is the nutritional status of children under 5 years old
Singh S, Srivastava S, Upadhyay AK	India	Research Paper	Slum children's have the worst health indices among the urban group and even poorer than rural average. There are 13.7 million slum household in India which constitute more than 17% of the urban household as per census 2011.
Som S, Pal M, Bharati P	India	Research paper	One of the most important indicators of a household's living standard and child survival is the nutritional status of children under 5 years old. Many studies show that there is a series of connections shared with the socioeconomic status of a household related to the child's nutrition.

CONCEPTUAL FRAMEWORK
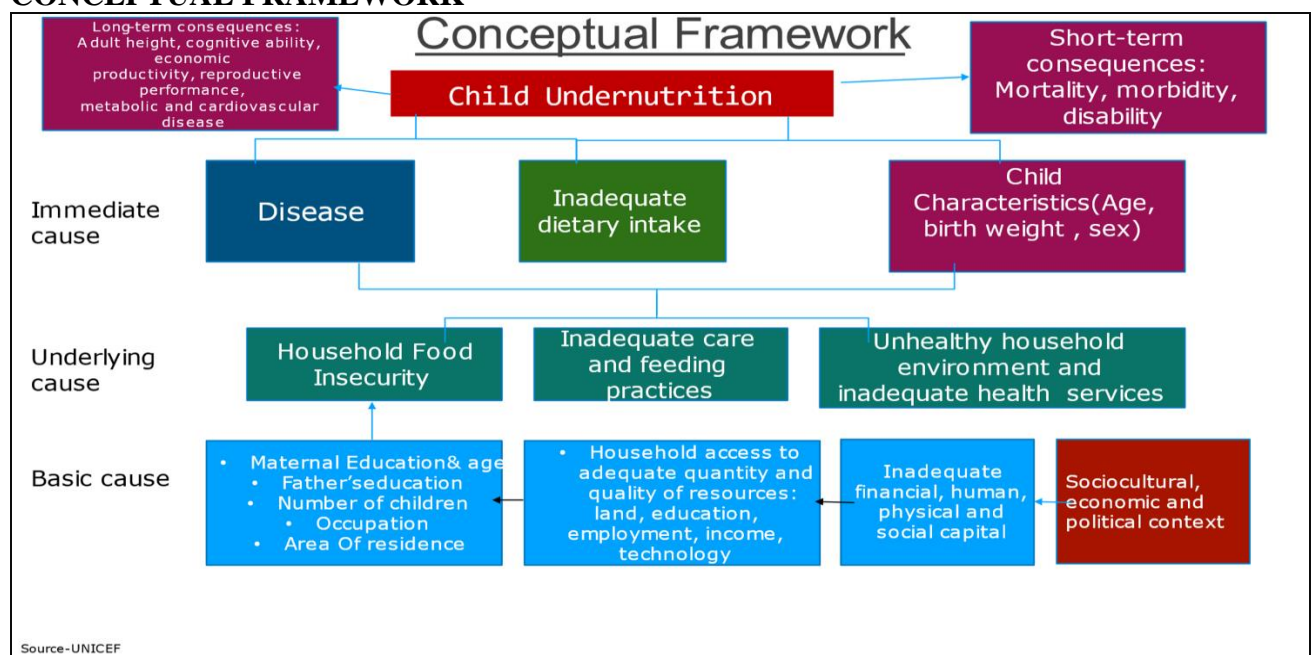
OBJECTIVE

To access the nutritional status and prevalence of underweight, stunting and wasting among the age group of 3-5-year-old children in the urban slums of Delhi.

METHODOLOGY

Study design and site

Cross sectional study involving slum of southern region of Delhi.

Study population

Children of the age group 3-5-year-old

Sampling Procedure

Multistage random sampling

Sampling size is calculated according to the prevalence of malnutrition 20%

Calculated by formula 4PQ/L2

P=prevalence of malnutrition (taking as 20%), Q= 100-P, L= Allowable error (5%)=4*20*80/5*5=256 children

Inclusion criteria

- Children of the age group 3-5-year-old.
- Those children who were present at the time of household visit and not seriously ill.

Exclusion criteria

- Children <3 years of age and >5 years of age.
- Children having cerebral palsy, congenital malformation, HIV infection or any other chronic morbidity and suffering from serious illness.
- Those family not giving consent were excluded.

Data collection and Ethical consideration

Data is collected using a scientifically designed pretested semi structured questionnaires on socioeconomic status of the family, mother's education, birth history and hygienic practice etc. The age, date of birth, is recorded by asking mother and confirmed by the records (MCP cards/Immunization cards). Inform concern is taken from the parents for the interview. Each interview lasted for 20-30 minutes. Anthropometric measures were taken using weighting machine, MUAC tape and measuring board with the help of an Angan wadi worker.

Analysis of data

Quantitative variables are presented in the form of absolute numbers and percentage. To identify the demographic and individual variables associated with the nutritional status, WHO dimension is divided into different categories of Stunting, Underweight, wasting and normal nutrition. Stunting, Underweight and Wasting is further classified into mild moderate and severe. The independent variables are explored into: sex, age, height, weight, Mothers age, Parental education, Hygiene practice of care giver, feeding practice of children.

Operational definition

Adequate hygiene Hand washing with soap and water at critical times including before eating or preparing food and feeding the baby, after using the toilet and disposing excreta of the baby in the toilet was considered adequate hygienic practice. Absence of such practice or lacking any of the components is inadequate practice.

Adequate feeding Frequency, for 13-60 months 3 major meals with 2 nutritious feed irrespective of frequency of breastfeeding. (7)

Anthropometric measurements will be carried out like, weight taken in a standardized scale in kilogram with minimum clothing and length measured by infant meter in supine position for children below 2 years and height of the child will be measured for those who can stand. Mid Upper Arm Circumference (MUAC) was measured with MUAC tape in a standardized way. Nutritional Status will be assessed using weight for age (underweight), height for age (stunting), weight for height (wasting) and MUAC according to WHO criteria (SD Classification).

Parental education It is defined as the highest level of schooling attended, but not necessary completed. This variable has three categories: Illiterate, primary, secondary education or more.

Parental occupation: It describes the socio economic status of the family in which the child has been brought up and what all things that can be afforded by the parents for their child's nutrition and health.

MALNUTRITION: Malnutrition refers to deficiencies or excesses in nutrient intake, Imbalance of essential nutrients or Impaired nutrient utilization in the body. It can be classified into two categories undernutrition and over nutrition. Undernutrition can be further classified into wasting (low weight for height), stunting (low height for age), underweight (low weight for age) and micro nutrient deficient.
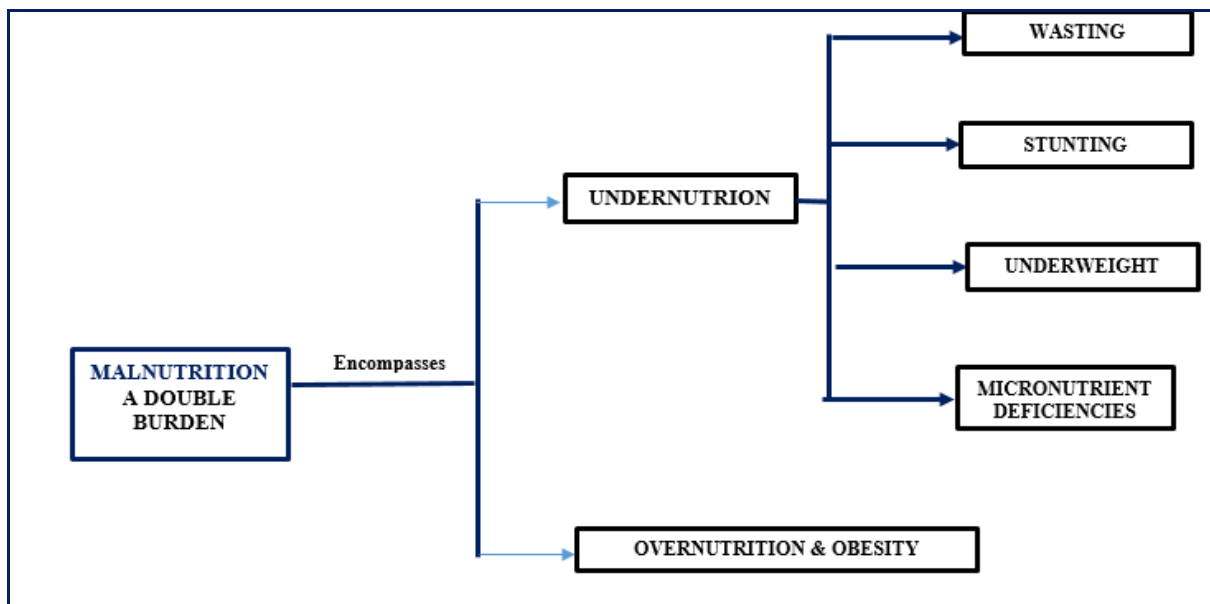
SOURCE: https://www.who.int/health-topics/malnutrition#tab=tab_1
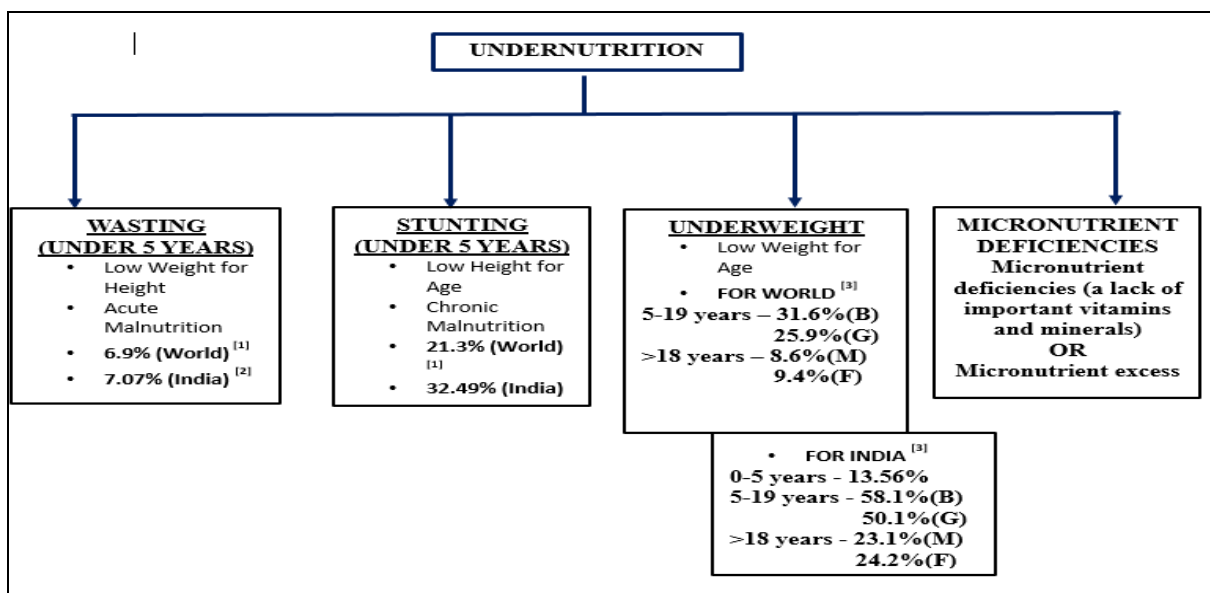
SOURCES: - The UNICEF/WHO/WB Joint Child Malnutrition Estimates (JME) group released new data https://apps.who.int/gho/tableau-public/tpc-frame.jsp?id=402

Accelerating Progress on Nutrition in India What Will It Take? THIRD PROGRESS REPORT NITI   AAYOG, WCD DIVISION, JULY 2020 https://niti.gov.in/sites/default/files/2020-10/AbhiyaanMonitoringReport.pdf

GLOBAL NUTRITION REPORT 2020 https://globalnutritionreport.org/

NUTRITION STATUS IN INFANTS & CHILDREN

Table 1   World Health Organization (WHO) classification of nutritional status of infants and children

Nutritional status	Age: birth to 5 years Indicator and cut-off value compared to the median of the *WHO child growth standards*[a]
Obese	Weight-for-length/height[b] or BMI-for-age >3 standard deviations (SD) of the median
Overweight	Weight-for-length/height[b] or BMI-for-age >2 SD and ≤3 SD of the median
Moderately underweight	Weight-for-age <−2 SD and ≥−3 SD of the median
Severely underweight	Weight-for-age <−3 SD of the median
Moderate acute malnutrition	Weight-for-length/height[b] or BMI-for-age ≤−2 SD and ≥−3 SD of the median, or mid-upper arm circumference ≥115 mm and <125 mm
Severe acute malnutrition	Weight-for-length/height[b] or BMI-for-age <− 3 SD of the median or mid-upper arm circumference <115 mm, or bilateral pitting oedema
Moderately stunted (moderate chronic malnutrition)	Length/height-for-age[b] ≤−2 SD and ≥−3 SD of the median
Severely stunted (severe chronic malnutrition)	Length/height-for-age[b] <−3 SD of the median
Moderately wasted	Weight-for-length/height ≤−2 SD and ≥−3 SD of the median
Severely wasted	Weight-for-length/height <−3 SD of the median

SOURCE: Guideline: Assessing and Managing Children at Primary Health-Care Facilities to Prevent Overweight and Obesity in the Context of the Double Burden of Malnutrition: Updates for the Integrated Management of Childhood Illness (IMCI)
https://www.who.int/publications/i/item/9789241550123

<u>**SEVERE ACUTE MALNUTRITION(SAM)**</u>
Prevalence in INDIA (CNNS 2016-18)
Severe Wasting: 4.9%
MUAC: 0.9%
<u>**SOURCE :** **https://www.who.int/publications/i/item/9789241550123**</u>

Severe acute malnutrition is a state in which the children's weight for height ratio is <− 3 SD of the Median, Mid-upper Arm Circumference(MUAC) <115 mm (11.5 cm) or Bilateral Pitting Edema is present in a child. It is most commonly seen in the children below the age group of 5 years old.

<u>**Weight-for-length/Height (Severe Stunting) <− 3 SD of the Median**</u>
or
<u>**Mid-upper Arm Circumference(MUAC) <115 mm (11.5 cm)**</u>
or
<u>**Bilateral Pitting Edema**</u>

Seen in UNDER 5 CHILD

RESULTS

A cross-sectional descriptive study was conducted out from 15 June 2021 to 30 June 2021 in the urban slums of Munirka, New Delhi. In the study, the nutritional status of children under the age group of 3-5 years was analyzed. The total number of children covered is 256. The study was carried out through a questionnaire and taking the anthropometric measures using a weighing scale, Inch tape and MUAC tape.
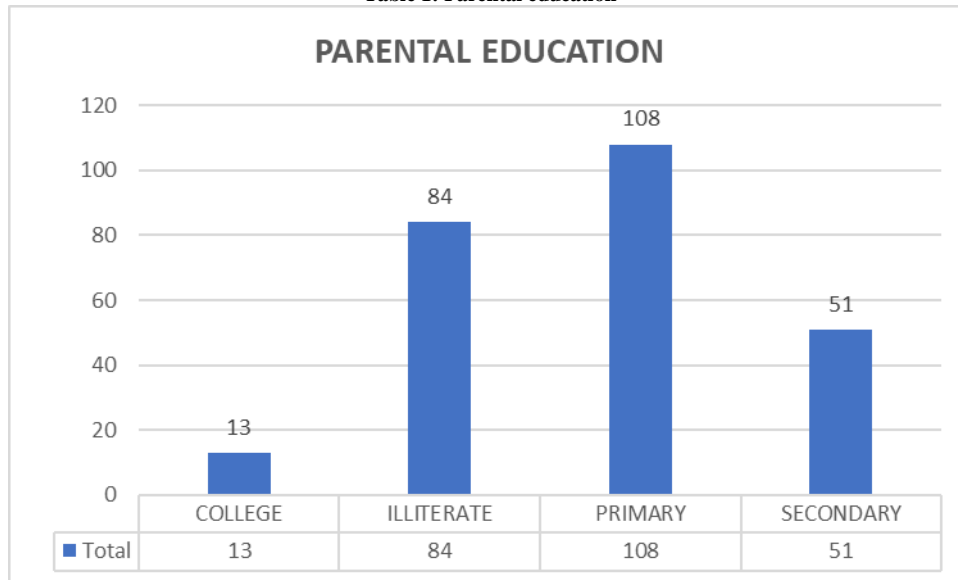
Table 1: Parental education

PARENTAL EDUCATION

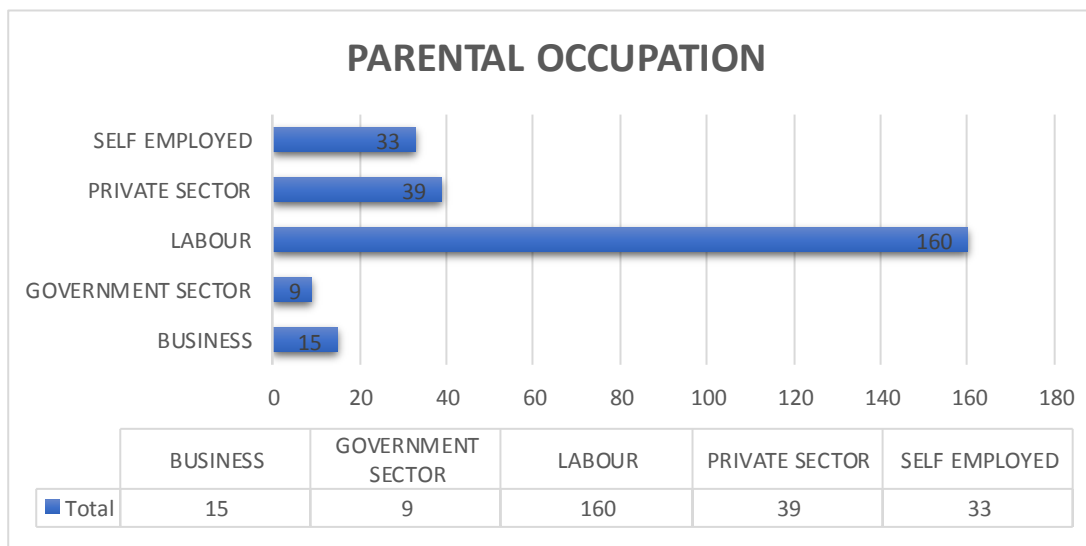|	COLLEGE	ILLITERATE	PRIMARY	SECONDARY
■ Total	13	84	108	51

Table 1 shows the educational status of the parents. Out of the total population, most of the parents are educated till the primary standard of school with a count of 108, 84 parents are illiterate, 51 parents studied till secondary standard and only 13 parents went to college for their education.

Table 2 shows the socio-economic status of the parents.

PARENTAL OCCUPATION

	BUSINESS	GOVERNMENT SECTOR	LABOUR	PRIVATE SECTOR	SELF EMPLOYED
■ Total	15	9	160	39	33

Out of the total number of parents, 160 parents come under labor population which depends on the daily wages for their livelihood,39 parents work in the private sector, 33 parents are self-employed with work like mechanic and driver,15 parents

are shopkeepers and 9 parents work in the government sector with work of a security

guard and clerk.

Chart 3 Age of the mother
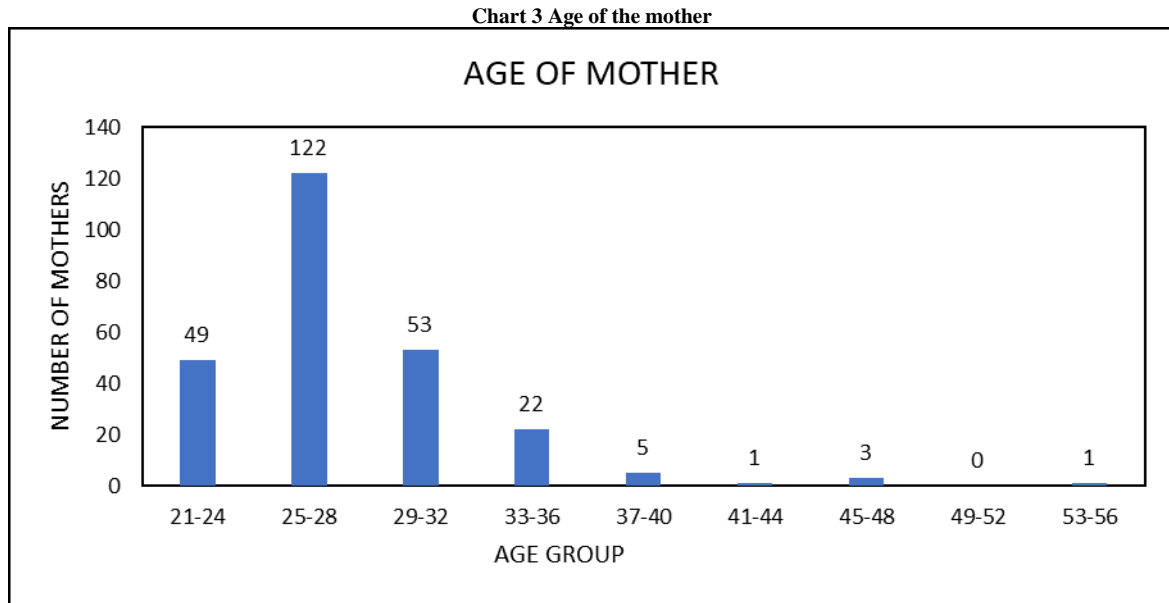
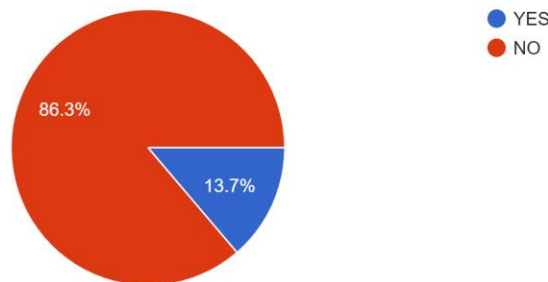| AGE GROUP	NUMBER OF MOTHERS
21-24	49
25-28	122
29-32	53
33-36	22
37-40	5
41-44	1
45-48	3
49-52	0
53-56	1

Table no – 3   Number of mothers according to the age group

According to the study population, most of the mothers fall in the age group of 25 to 28 years with an absolute number of 122 mothers, 53 mothers fall in the age group of 29-32 years, 49 mothers fall in the age group of 21- 24 years, 22 mothers fall in the age group of 33-36 and a very less proportion in the age group of 36 and above.

Chart no 3: Recent diarrheal incidence

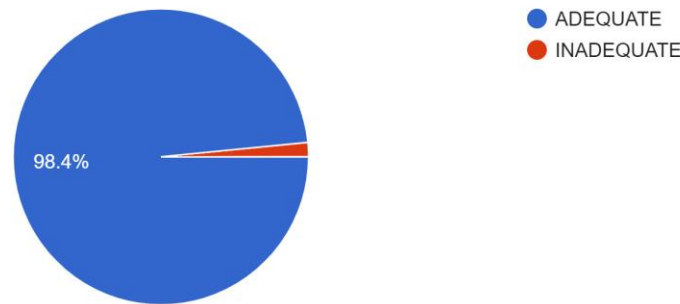HYGIENE PRACTICE OF THE CARE GIVER
255 responses

Chart no 4: Hygiene practice of the caregiver

Diarrhoea is a condition of loose, watery stools three or more times a day. Diarrhoea can be acute, persistent, or chronic: Acute diarrhoea is a common condition that lasts 1 or 2 days and goes away on its own. Persistent diarrhoea lasts more than 2 weeks and less than 4 weeks.

Diarrhoea can lead to reduction in food intake, decrease in absorption of nutrients, and increase in the catabolism of nutrient reserves

In the chart, no 3 and 4 it has been observed that the incidence of diarrhoea has been reduced to 13.7% as the hygiene practice of the caregiver is improved with an approx. of 98.4%.
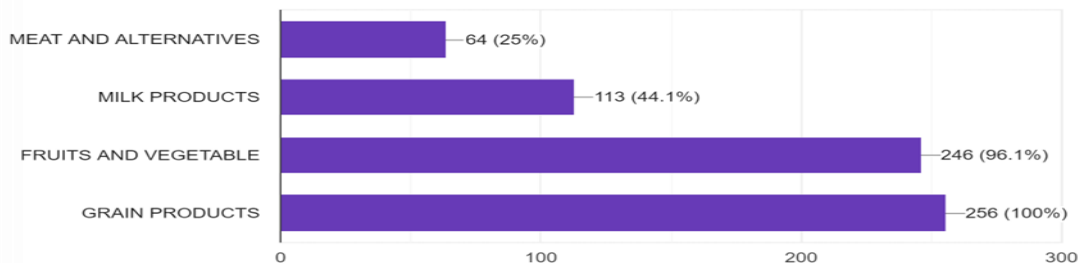
ENERGY DENSE FOOD
256 responses

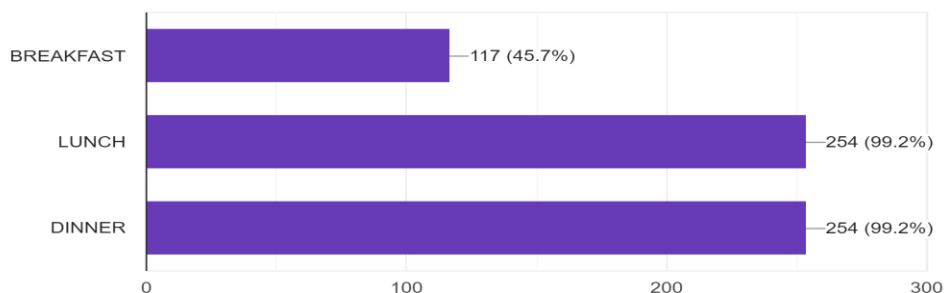**Chart no 5- Meals per day**

MEALS PER DAY
256 responses

Chart no 6- Energy-dense food

FOOD SUPPLEMENTATION
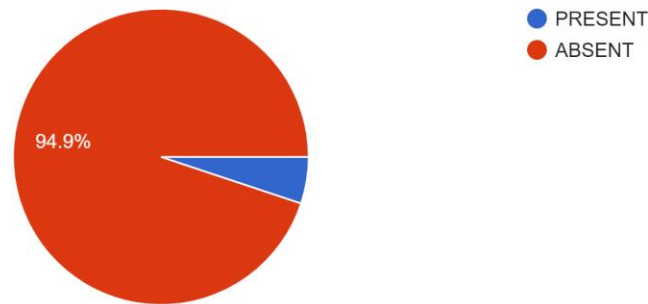255 responses

- PRESENT
- ABSENT

94.9%

Chart no 7- Food supplementation

Nutritional intake of the children

This study found out that among the major meals- breakfast, lunch and dinner only 117 children out of 256 children in the age group of 3to 5 years old take breakfast, 254 children take lunch and dinner on the daily basis as per the daily meal consumption.

Among the energy-dense food, 25 per cent of the children take meat and alternative which is rich in protein,44.1 percentage of the children take milk products constituents of water, fat, protein, lactose and minerals, 96.1 per cent of children takes fruit and vegetables which provides a range of nutrient, bioactive compounds and fiber and 100 percentage of children take grain products mainly consist of rice and wheat as per the survey.

Food supplementation is almost absent among the slum children in the age group of 3 to 5 years old. As the parents don't have much knowledge of food supplementation.
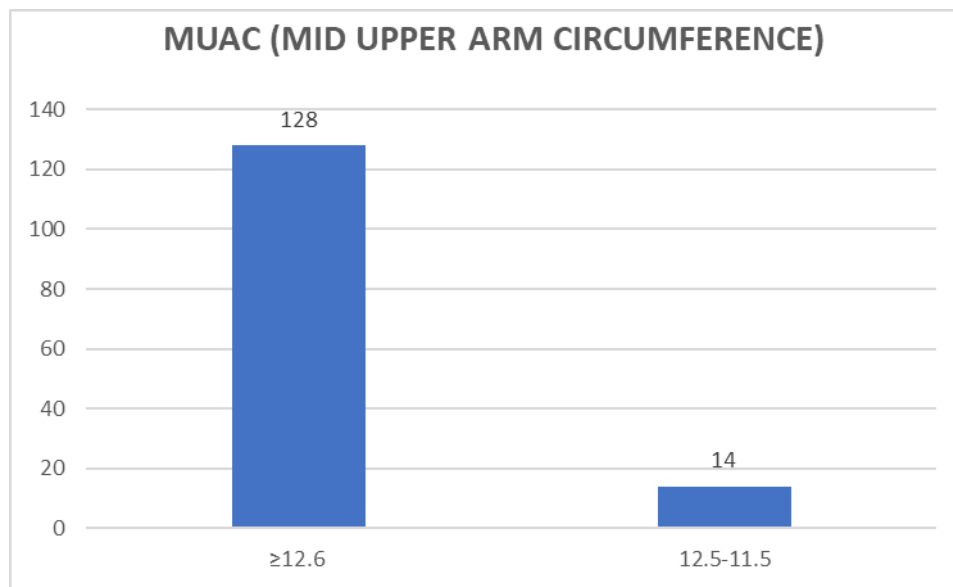

Chart no 8 – MID UPPER ARM CIRCUMFERENCE

MUAC (MID-UPPER ARM CIRCUMFERENCE)	Count of MUAC (MID UPPER ARM CIRCUMFERENCE)	Percentage
≥12.6	128	90.2%
12.5-11.5	14	9.8%

Table no 4 - Count of MUAC

Mid upper arm circumference is a measurement that allows us to determine if the child is acutely malnourished. Acute malnutrition is a nutritional deficiency

resulting from either inadequate energy or protein intake.

As per the survey 90.2 percentage of the children comes under the range of more than equal to 12.6 (Green colour) indicating

the children is well nourished and 9.8 per cent of the children falls under the range of 12.5- 11.5 (Yellow colour) indicating that the child is at risk for acute nutrition.

WEIGHT FOR AGE

256 responses

Legend:
- <- 3 SD
- ≥-3 SD to <-2 SD
- ≥ -2 SD to ≤ +2 SD
- >+2 SD to ≤ +3 SD
- >+ 3SD

44.9%
21.1%
34%

Chart no 9 – Weight for age

WEIGHT FOR AGE	Count of WEIGHT FOR AGE	PERCENTAGE
<- 3 SD	87	34%
≥ -2 SD to ≤ +2 SD	115	44.9%
≥-3 SD to <-2 SD	54	21.1%

Table no 5– Count of weight for age

Weight for age is an indicator to check the nutritional status of the children whether the child is severely underweight, Moderately underweight, Normal, Overweight and obese. Which is categorized into <-3SD, ≥-3SD to <-2SD, ≥-2 SD to ≤+2SD, >+2SD to ≤+3SD and >+ 3SD.

As per the survey, 34 per cent of the children were severely underweight, 21.1 percentage of the children were of moderately underweight and 44.9 percentage of the children have normal weight as per the WHO simplified standard chart of weight for age.
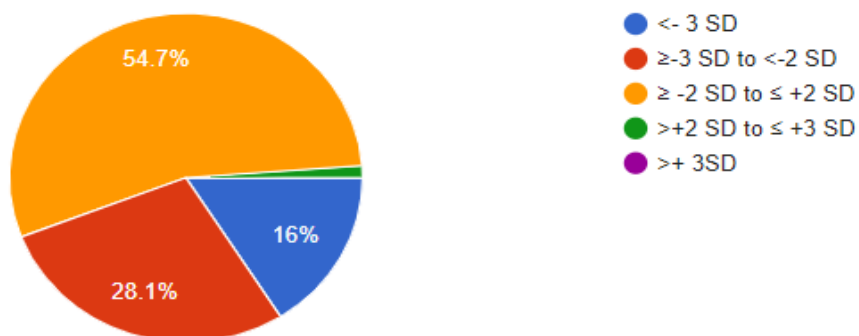
HEIGHT FOR AGE

256 responses

Legend:
- <- 3 SD
- ≥-3 SD to <-2 SD
- ≥ -2 SD to ≤ +2 SD
- >+2 SD to ≤ +3 SD
- >+ 3SD

54.7%
16%
28.1%

Chart no 10- Height for age

HEIGHT FOR AGE	Count of HEIGHT FOR AGE	PERCENTAGE
<- 3 SD	41	16%
>+2 SD to ≤ +3 SD	3	1.2%
≥ -2 SD to ≤ +2 SD	140	54.7%
≥-3 SD to <-2 SD	72	28.1%

Table no 6 – Count of Height for age

Height for age is an indicator to check the chronic nutritional status of the children whether the child is severely stunted, stunted, Normal and more than normal. Which is categorized into <-3SD, ≥-3SD to <-2SD, ≥-2 SD to ≤+2SD, >+2SD to ≤+3SD and >+ 3SD.

As per the survey, 16 percentage of the children were severely stunted, 28.1 percentage of the children were stunted, 54.7 percentage of the children were normal and a small amount of the children were more than normal by 1.2 percentage.

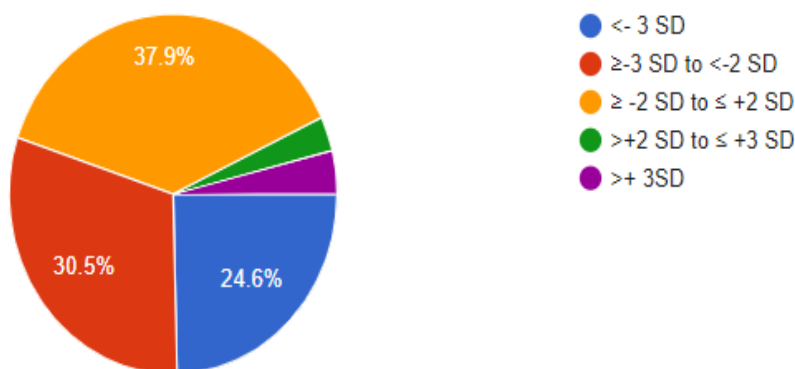## WEIGHT FOR HEIGHT

256 responses

Chart no 11- Weight for Height

WEIGHT FOR HEIGHT	Count for WEIGHT FOR HEIGHT	PERCENTAGE
<- 3 SD	63	24.6%
>+ 3SD	10	3.9%
>+2 SD to ≤ +3 SD	8	3.1%
≥ -2 SD to ≤ +2 SD	97	37.9%
≥-3 SD to <-2 SD	78	30.5%

Table no 7– Count of Weight for height

Weight for Height is an indicator to check the acute nutritional status of the children whether the child is severely acutely malnourished, moderately acute malnourished, Normal, overweight and obese. Which is categorized into <-3SD, ≥-3SD to <-2SD, ≥-2 SD to ≤+2SD, >+2SD to ≤+3SD and >+ 3SD.

As per the survey, 24.6 per cent of the children were severely acutely

malnourished, 30.5 percentage of the children were moderately acute malnourished, 37.9 percentage of the children were normal, 3.1 percentage of the children were overweight and 3.9 percentage of the children were obese.

DISCUSSION

This study was conducted in the urban slums of South Delhi where the children belonged to the poor families of daily wage workers. The slum children's have the worst health indices among the urban group and

are even poorer than the rural average. There is 13.7 million slum household in India which constitute more than 17% of the urban household. They are often left behind in availing of the essential facilities.

As the pandemic of COVID-19 rose, the people staying over in the slum became unemployed and even poorer as many of them had to leave to their own villages. They stay in very congested spaces with one house stuck to another and very small space to even move out as pathways. The children over there don't even have a safe space to play and do other activities. There was a disruption in the services of Anganwadi centers under ICDS after the first wave of COVID-19 in the urban slums. The vulnerability is higher in urban slums as they rely on government programs for their needs. This kind of disruption can only exuberate food insecurity. [16,17]

As per the POSHAN Abhiyaan (Prime Minister's Overarching Scheme for Holistic Nourishment), 3rd progress report by NITI Aayog (JULY 2020) the overall percentage of stunted children (0-5 years) is 32.4 percentage, underweight children (0-5 years) is11.69 percentages and wasting children (0-5 years) is 7.07 percentage in India. In Delhi as per the report, there is 37.74 percentage of children (0-5 years) are stunted, 12.9 per cent of children (0-5 years) who are underweight and 5.16 per cent of children (0-5 years) are wasted.

When we compare the data with urban slums of Delhi there is a huge difference in the percentage of malnourish children in the age group 3-5 years with an average of 55% of children being wasted, 44.14 % of the children who are stunted and 55.07 % of the children who are underweight. The current COVID-19 situation in India could have aggravated malnutrition among children The nutritional status of children is extremely susceptible to the smallest of shocks to bodyweight.

CONCLUSION
Malnutrition is highly prevalent in the study population of the urban slums of Delhi. In the form of both acute and chronic malnutrition. Out of 256 children, 34 per cent of the children are severely underweight, 16 percentage of the children are severely stunted and 24.6 percentage of the children are severely acutely malnourished. 21.1 percentage of the children comes in the category of moderately underweight,28.1 percentage of the children comes in the category of moderately stunted,30.5 percentage of the children comes in the category of moderately acute malnourished. It has been observed that the diarrhoeal conditions of the children were reduced to 13.7 per cent as the hygiene practice of the caregiver is improved due to the Pandemic situation of Covid-19.

Recommendation
Community awareness on clean and appropriate child feeding should be carried out by the AWW and ASHA. Strengthening of ICDS program. Regular deworming services for the children should be strengthened. Encouragement and strengthening of appropriate complementary feeding with breastfeeding for the child after six months of age and nutritional supplementation should be recommended. Girl's education to be promoted. All the measures should be sincerely and continuously applied to improve the health of slum children and fight malnutrition in the community.

Limitation
Anthropometric measures are relatively insensitive method as it cannot identify the specific nutritional deficiencies
Observational biases can happen during recording of data.

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