Effect of Socio-economic Factors on Malnutrition of Children

A project submitted in part fulfilment of the requirement for the
completion of an undergraduate degree in Statistics

(2021-24)

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by
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DECLARATION

I, RATNESH PATI TRIPATHI hereby declare that project entitled "Effect of **Socio-economic Factors on Malnutrition of Children"** is submitted by me, under the guidance and supervision of Dr. NIRPEKSHA KUMAR. I also declare that it has not been submitted previously in part or in full to this university or any university or institution for the award of any degree or diploma.

Date : 22-05-2024   **RATNESH PATI TRIPATHI**

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CERTIFICATE

This is to certify that the project entitled **"Effect of Socio-economic Factors on Malnutrition of Children" submitted by RATNESH PATI** in part fulfilment of the requirement for the completion of an undergraduate degree in Statistics is carried out by him under my guidance.

Date : 22-05-2024   **DR. NIRPEKSHA KUMAR**

                                    (Supervisor)

ACKNOWLEDGEMENTS

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1 Abstract

The goal of this graduation project is to look into how socioeconomic factors may affect how frequently children are malnourished. In order to understand how different variables such as gender, age, parental education level, family type, and birth order interact with one another, the study looks at how malnutrition is impacted by these associations. All segments of society were represented in the cross-sectional survey that was performed in a rural Gorakhpur region and through Google Forms. 182 youngsters between the ages of 6 months and 12 years made up the study sample. The findings indicate that birth order, parental education, family type, and gender are important determinants of childhood malnutrition. Male children, children from larger households, children from worse educational backgrounds, and children with higher birth orders are more likely to be underweight. The findings highlight the need for policies and programmes to address the socioeconomic determinants that cause childhood malnutrition, especially in rural areas.
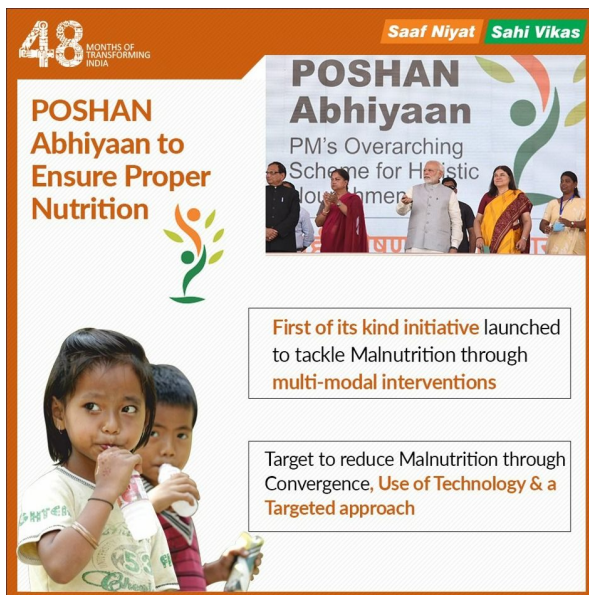
2 Introduction

Each and every infant, who grows and develops at his or her own rate and in his or her own time, reaches the various developmental milestones. The environment, diet, and parental engagement of each child have an effect on their growth, which doesn't happen in a straight line. These elements are necessary for a child to develop to their full potential. Recent research has demonstrated that a child's health outcomes are significantly influenced by healthy diet, particularly in the early years of life. The nutritional state of a community's youngsters really serves as an accurate proxy measure of that community's health.

World Health Organisation (WHO) states that - "Malnutrition is deficits or excesses in food intake, an imbalance of critical nutrients, or impaired nutrient utilisation. The double burden of malnutrition includes noncommunicable diseases linked to diet-related noncommunicable diseases as well as undernutrition, overweight, and obesity. Underweight, stunting (acute malnutrition), wasting (chronic malnutrition), and deficiency in certain micronutrients are the four main indicators of malnutrition."

2.1 Need for the Study

Malnutrition affects nearly two-thirds of India's population under the age of five, making it one of the most common conditions affecting children's health in the nation. 5-8 percent of them are very undernourished. Wikipedia states that even though India's GDP has increased by 50 % since 2013, there are still more than one third of the world's hungry children living there. Among them, 50 percent of the young children under the age of three are underweight.

In India, the majority of people live in villages. Only about 50 % of all

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rural residents are still considered to live in poverty. Due to their extremely low household incomes, the majority of toddlers in India do not have access to enough food. The physical and mental development of a sizable portion of these children is hampered by their social and economic circumstances.

Children from underprivileged families, including those who reside in slums, are more prone to undernutrition and overnutrition. According to studies conducted in Delhi, the nation's capital, between 58 and 75 percent of infants who reside in slums are underweight. In India's urban slums, starvation claims the lives of 56,000 youngsters every year. Unsurprisingly, there are reports that this ailment also affects children from affluent homes. Obviously, the problem is worse in the slums. A study found that obese children fall under the category of malnourished children because of their altered eating patterns.

2.2   Literature Review

Malnutrition, according to Brown (2013), is the lack of one or more nutrients essential for good health and wellbeing. Malnutrition can be caused by poor eating practises and food preferences, which result in the exclusion of other foods, the routine consumption of particular foods, or the consumption of large amounts of unnutritious foods. For instance, in some regions of Africa, weaning breastfed babies to a diet that consists primarily of one type of starchy food, like cassava, may result in a protein deficiency. (Rabinowitz et al, 2014).

Rayhan and Khan (2006) investigated the impact of demographic, socio-economic, and health related factors on child nutritional status using the Bangladesh Demographic and Health Survey (BDHS) 1999-2000. They found that previous birth interval, size at birth, and mother's education had a sig-

nificant influence on chronic malnutrition. Baranwal (2010) found that 58.3 % of male children had protein energy malnutrition (PEM) while 68.6 % of female children had it. Nyaruhucha (2006) found that under-nutrition was most prevalent among children aged 24-35 months while children less than a year were less vulnerable. Ruwali (2018) found that the risk of stunting increases with age. Khan and Azid (2011) found that malnutrition increases in urban and slum households with enhanced number of children.

Kiess (2000) and Sharifzadeh (2010) found that parents' illiteracy and insufficient ANC visits were significant factors of lower HAZ and WHZ. Alom 1 (2010) and Nyaruhucha (2006) found that stunting is strongly associated with sex and weight.

2.3 Government initiatives in India to address the issue

Despite the fact that the government makes repeated attempts to solve the issue given how crucial it is, children's nutritional status is frequently subpar. Some of them are :-

- The **National Health Mission** (NHM), whose primary programme components include strengthening the health system, reproductive-maternal, neonatal-child and adolescent health, and communicable and non-communicable diseases, was introduced in 2005 and extended in 2018.

- **POSHAN Abhiyan**

- **ICDS**

- Various programmes to ensure proper nutrition to children like **Midday meal scheme in Indian schools**, **Integrated child develop-**

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ment scheme, **National Plan of Action for Children** and many more.

2.4 Major socio-economic and demographic factors causing Malnutrition among children

A significant public health issue that primarily affects developing nations is child malnutrition. The growth of children and adults is significantly impacted by malnutrition (Takele, 2013; Tathiah et al., 2013; Walker et al., 2007). The following are some examples of the potential causes of childhood malnutrition :

- **Gender :** In India, women are more prone than boys to pass away during childbirth. This contrasts with the remainder of the world. Gender thus emerges as a clear factor driving variations in malnutrition patterns.

- **Age Category :** Age-related physiological changes, such as diminished taste and scent, decreased gastric flexibility, decreased appetite, etc. have the potential to cause or hasten malnutrition. Different ages and weights at birth also have a significant effect on a child's health.

- **Parent's Educational Status :** According to a study, education levels significantly affect people's awareness of different health issues. Thus, another crucial element in our research is the educational level of the child's parents.

- **Parent's level of Education :** The degree of education is important in addition to the educational status. A postgraduate would almost always be more knowledgeable and possess a deeper grasp.

- **Monthly Family Income :** You can't just purchase whatever you want because money doesn't grow on trees, as is often said. According

to Wikipedia, economic disparity is one of the main causes of malnutrition in India.

- **Family Type :** A research clearly stated that the happiness and the physical well-being of a child depends a lot on the family type of the child. It was found that the child belonging to joint families were better than that of belonging to the single families.

- **Birth Order & Interval**

3 Methodology used for the Survey

3.1 Planning of the Survey

Understanding the origins of childhood malnutrition and any potential long-term implications was the aim of this investigation. To accomplish this, a hypothesis was given. A quantitative approach was also selected for the same. Residents were the main emphasis, regardless of whether they lived in slums or tall buildings, had advanced degrees or not, had a single child or five or six children, or were a huge family. The importance of the study is in identifying the causes of hunger and the degree to which each cause affects the state. These results will enable us to comprehend how parental ignorance of young children's malnutrition may be one of its contributing causes. It will assist us in comprehending the significance of studying the problem, the most effective way to do so, and how to increase the scope of the topic's potential for further study.

3.2 Objective of the Survey

The major goal of the study was to evaluate the risk factors for malnutrition in children belonging to different parts of the society.

Specific objectives of the study are :-

1. To precisely describe the socio-economic and demographic elements that affect malnutrition in young children

2. To investigate the association between socioeconomic and demographic factors and childhood malnutrition

3. To assess the nutritional status of children

3.3 Area of the Survey

The region for sample collecting need to have been bigger in accordance with the survey's goals. However, I have restricted it to just a few kids from Gorakhpur and relatives in various areas of the country due to logistical considerations and difficulties. Children are readily available to assist me with this survey because I am a resident of that area, and the parents of the children who were selected for the survey honestly coordinated with everything.

3.4 Sampling Technique

The sample was chosen using convenient sampling as the sampling methodology, and a total of 182 samples were collected using in-person interviews & online surveys.

3.5 Technique of Data Collection

Online surveys and in-person interviews (for the specific set of people) were used to collect the data for this study, which was perhaps the best strategy considering the significance of the topic and the difficulties and difficulties it presented. We conducted surveys all around the city and teamed up with Anganwadi Centre (AWC) to get information from the slums.

3.6 Software and Technique used for Data Analysis

Data analysis is the process of distilling raw data, comprehending its meaning, and providing succinct responses to the questions that interest us. Microsoft Excel has made it simple for me to handle and tabulate data for this reason. Statistical tools from MS EXCEL, such as pie charts, bar charts, scatter plots, and histograms, were used to analyse and interpret the data. Chi-Square testing has also been used in the same way. The correlation between different parameters has also been determined and displayed using the correlation coefficient.

3.6.1 Concept of Chi-Square Testing

To ascertain whether there is a significant correlation between two nominal (categorical) variables, the Chi-square test of independence is performed. A comparison is made between the frequencies of each category for one nominal variable and the categories for the second nominal variable. A contingency table can be used to display the data, with each row denoting a category for one variable and each column a category for the other. To do so, we first define our hypotheses - Null hypothesis and Alternative hypothesis as -

$$H_0 \text{ : The two attributes are independent}$$

$$H_1 \text{ : The two attributes are dependent}$$

The test statistic is defined as -

$$\chi^2 = \sum_{i=1}^{r} \sum_{j=1}^{s} \frac{(o_{ij} - e_{ij})^2}{e_{ij}}$$

where,

o_{ij} = Observed frequency for contingency table category in i^{th} column and j^{th} row,

e_{ij} = Expected frequency for contingency table category in i^{th} column and j^{th} row.

Tabulated value of χ^2 is obtained by using $(i - 1)(j - 1)$ degrees of freedom at α level of significance. The null hypothesis can be tested either at 5% or 1% level of significance.

If $\chi^2_{Cal} < \chi^2_{Tab}$, then we do not rule out H_0, which demonstrates the independence of the two variables. Otherwise, we might reject H_0, which demonstrates the interdependence of two variables.

3.7   Duration of the Survey

I began collecting data in FEBRUARY, 2024 in accordance with my research question, and I finished the task by the middle of April. Up until April 30th, 2023, tabulation and data analysis were completed.

4 Tabulation and Graphical Representation

After compiling all the data in accordance with the questionnaire, a total of 182 respondents. A number of probable factors, such as gender, age, parental education level, and others, that may influence child malnutrition were identified and the results are displayed in the following tables and graphs.

4.1 Gender

Table 1: Gender Distribution in Sample

Gender ↓	Frequency	Percentage
Female	85	46.70 %
Male	97	53.29 %
Grand Total	182	

* The survey involved a total of 85 (46.70 %) females and 97 (53.29 %) males and as shown in the chart 4.1.
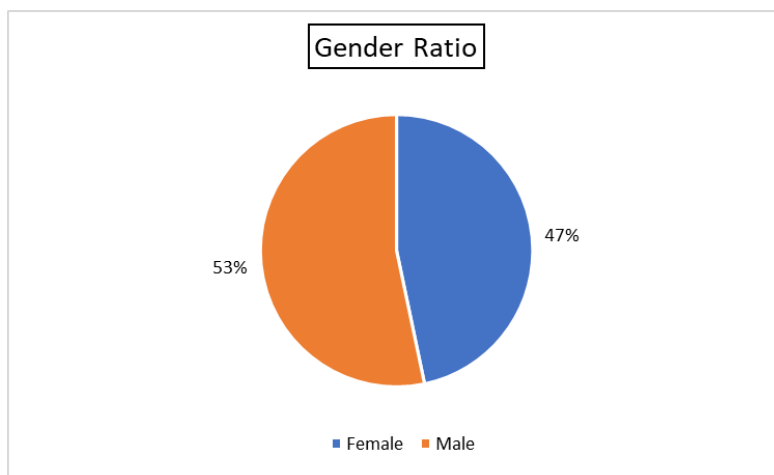
Table 2: Gender v/s Malnutrition

	Fit	Malnourished	Malnourished Percentage
Female	50	35	41.17 %
Male	54	43	44.32 %
Grand Total	104	78	42.85 %

* And of the total sample, 35 females and 43 males, i.e. total 78 (42.85 %) children were found to be undernourished.
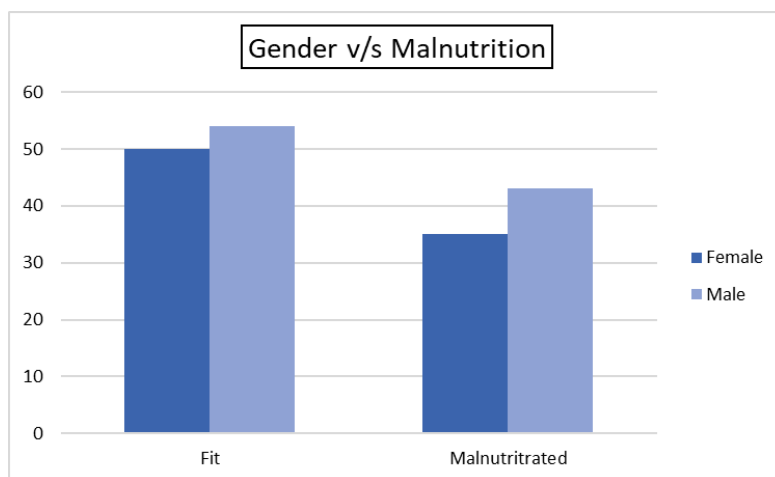
Interpretation :-

- 85 females in total were evaluated; 50 were deemed healthy based on their weights and ages, while 35, or 41.17%, were deemed undernourished.

- 54 of the 97 guys were determined to be in good physical condition given their weights and ages, whereas 43, or 44.32%, were deemed to be malnourished.

- A total of 182 children's data, including both boys and females, were analysed, and of those, 78, or 42.85%, were undernourished. 35.5% of children in India were stunted (source : Outlook India), which is in some ways similar to our finding.

4.2   Age Category

Table 3: Age Distribution in Sample

Age in Years ↓	Frequency	Percentage
0 - 1	14	7.69 %
1 - 4	74	40.66 %
5 - 8	71	39.01 %
8 +	23	12.63 %
Grand Total	182	

* As shown in the chart 4.2, a total of 182 kids from the age ranges 0-1, 1-4, 5-8, and 8+ participated in the survey. .
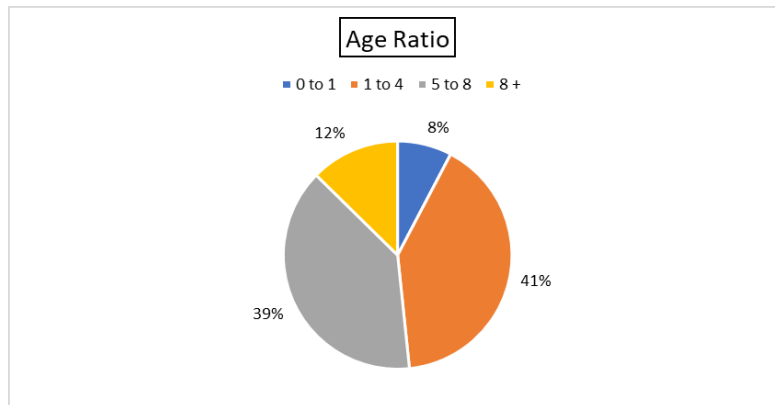
* Additionally, different percentages of kids in different age groups were found to be undernourished overall.

Table 4: Age v/s Malnutrition

Age in Years ↓	Fit	Malnourished	Malnourished Percentage
0 - 1	9	5	35.71 %
1 - 4	45	29	39.19 %
5 - 8	42	29	40.84 %
8 +	8	15	65.21 %
Grand Total	104	78	42.85 %
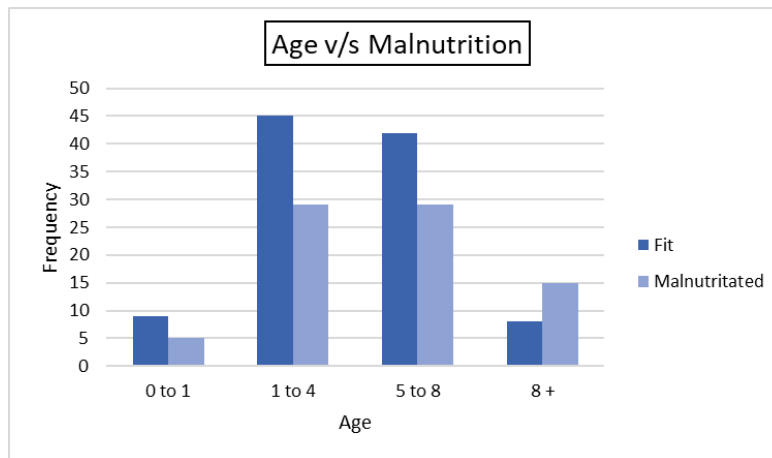
Interpretation :-

- Out of 14 newly born children, or those between the ages of 0 and 1, 5 were found to be undernourished, or 35.71 % stunted, which is quite understandable given that there may be many different factors at play at birth, including the mother's health during labour and delivery, the location of the child's birth, and many others.

- 29 people, or 39.19 %, of the age groups 1 to 4 were found to be malnourished.

- 29 children (40.84 %) between the ages of 5 and 8 were also undernourished.

- Children in the 8+ age group had the highest rate of underweight children (65.21 %). In most homes, a newborn or a child under the age of five receives the majority of care, but as children get older, they receive less of it, which could account for the upward trend in this graph 4.2.
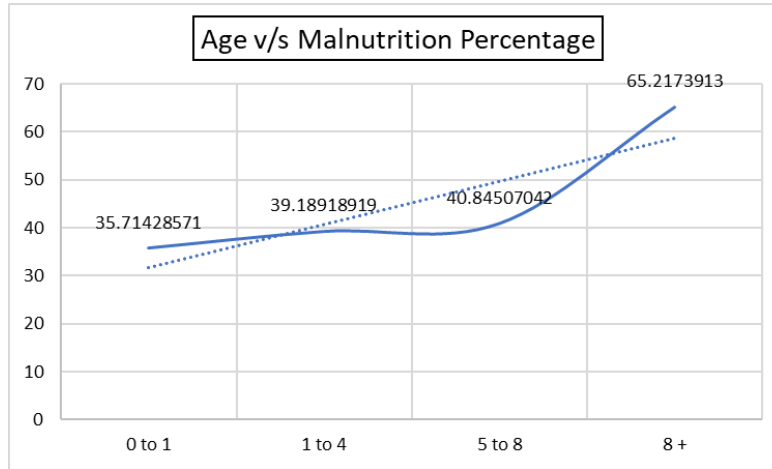
4.3   Educational Status of Parents

Table 5: Educational Status of Parents in Sample

	Educated	Illiterate	Educated Percentage
Mother	156	26	85.71 %
Father	174	8	95.60 %
Grand Total	330		90.65 %

* The parents of the 182 kids have a variety of educational backgrounds, as can be seen in the chart above. It is evident from this that 174 of the fathers and 156 of the 182 mothers, or 85.71 % and 95.60 % respectively, had postgraduate degrees. 182 * 2 (including both parents) = 364 persons were there, and 330 of them were educated.

Educational Status of Parents
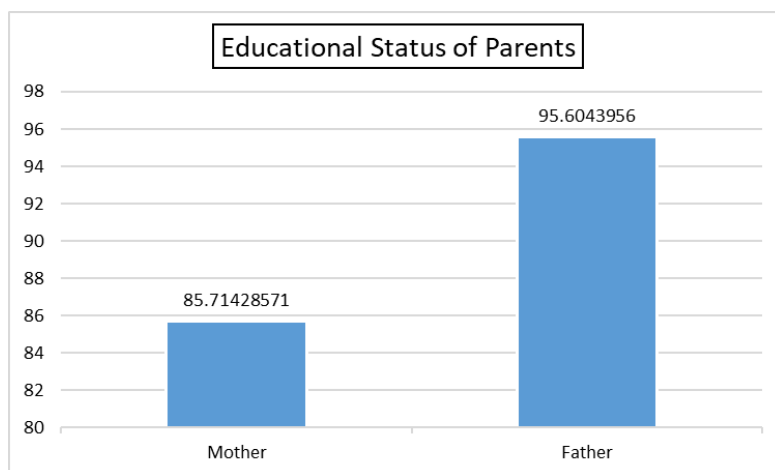
Table 6: Educational Status of Parents v/s Malnutrition

Mother	Fit	Malnourished	Malnourished Percentage
	Fit	Malnourished	Malnourished Percentage
Educated	91	65	41.67 %
Illiterate	12	14	53.85 %
Father			
	Fit	Malnourished	Malnourished Percentage
Educated	100	74	42.53 %
Illiterate	3	5	62.50 %
Grand Total	103	79	42.85 %

Interpretation :-

- According to the entire statistics, 95.60 % of fathers and 85.71 % of mothers were found to have completed at least a primary level education.

- Children with illiterate mothers are slightly more likely to have poor nutritional status than children with literate mothers. While 53.85 %

of children with illiterate mothers were stunted, 41.67 % of children with educated mothers were.

- In the case of fathers as well, a similar type of graph has been noted. Stunted children made up 42.53 % of children with educated fathers, compared to 62.50 % of children with illiterate fathers. However, the number of illiterate dads is extremely small, therefore additional information about this scheme may be required to support the findings.
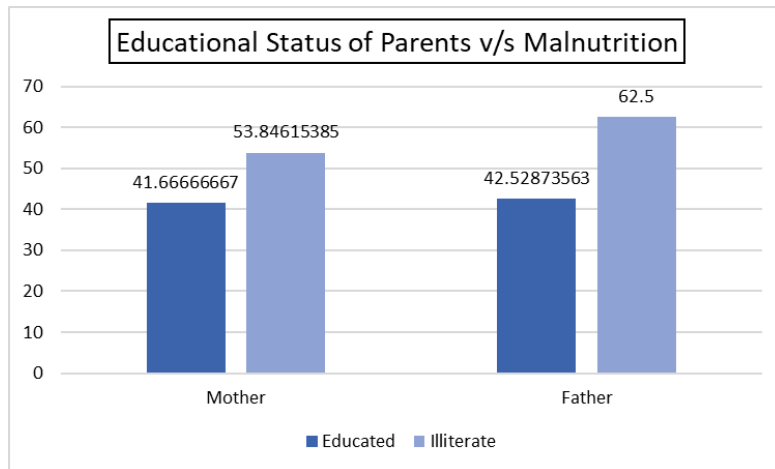
* The graph makes it clear how many more children with malnutrition there are when their parents are illiterate as opposed to those who are literate.

4.4   Parent's level of Education

* Children whose parents had different educational backgrounds were included in the data. Apart from those who are illiterate, the lowest level of education sought by dads was up to the sixth grade, while the lowest level of education found among moms was the second grade. Both parents sought a PhD as the highest degree.

Table 7: Parent's level of Education in Sample

	Mother	Father
Illiterate	26	8
10$^{\text{th}}$ or below	39	14
12$^{\text{th}}$	12	28
Graduation	44	44
Post Graduation	57	64
PhD or more	4	1
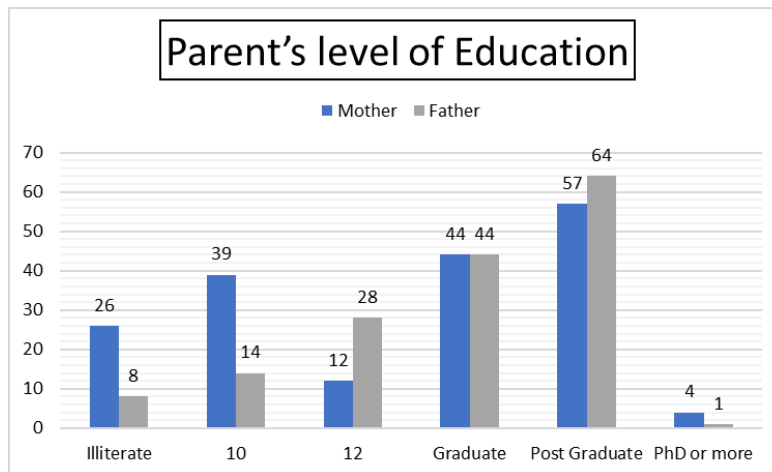
- As can be seen from the graph, a sizeable proportion of children have parents who either completed their education by the tenth grade or who then have a higher density at graduation with the highest density at post-graduation.

- 44 people in both categories sought a bachelor's degree in any stream as their greatest level of education, as seen in the graph 4.4.

- The statistics clearly shows that more men than women have chosen to seek higher education.

The table here now shows the percentage of children malnourished with parents of different levels of education.

Table 8: Parent's level of Education v/s Malnutrition

	Mother	Father
Illiterate	50 %	50 %
10th or below	46.15 %	50 %
12th	33.33 %	48.27 %
Graduation	29.54 %	36.36 %
Post Graduation	47.37 %	43.75 %
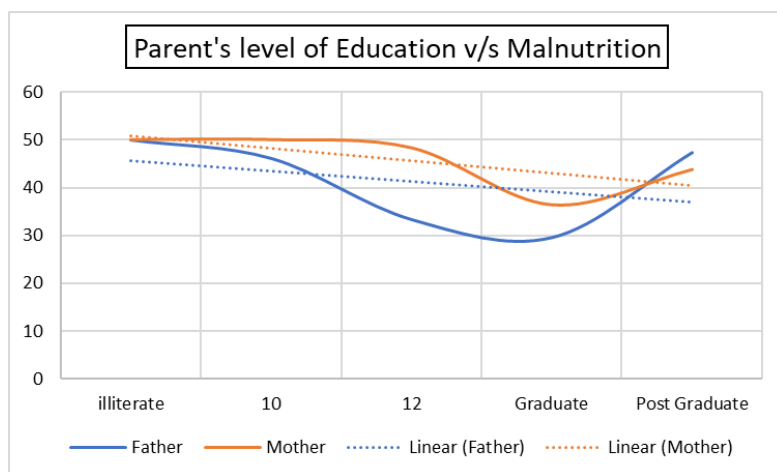
Interpretation :-

- According to graphs, the proportion of malnourished children gradually declines as parental education levels rise.

- The graph 4.4 dotted line indicates the regression line, which depicts the progression of physical fitness with increasing education level of parents.

4.5   Monthly Family Income

Table 9: Monthly Family Income v/s Malnutrition

Salary (in 000's)	Fit	Malnourished	Malnourished %
4 - 15	32	25	43.86 %
16 - 35	29	21	42 %
35 - 75	25	15	37.50 %
Above 75	24	15	38.46 %
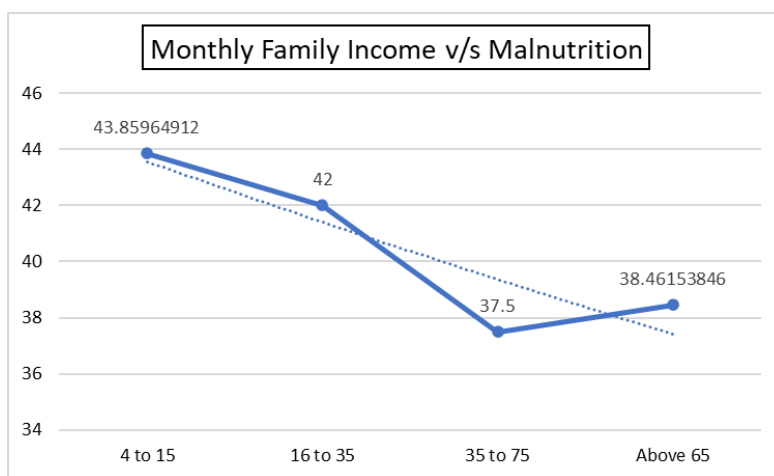
Interpretation :-

- 43.86 % of children in families with monthly family incomes between 4,000 and 20,000 were found to be underweight

- 42 percent of kids in the 16-35k wage bracket had stunted growth

- There are nearly equal percentages of undernourished children in the 35-75 and above-75k income brackets, which are 37.50 and 38.46 percent, respectively.

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- The graph 4.5 shows that childhood malnutrition steadily rises with rising average monthly income and nearly stays constant beyond 35,000

4.6   Family Type

Table 10: Family Type v/s Malnutrition

	Fit	Malnourished	Total	Malnourished %
Joint	45	38	83	45.78 %
Nuclear	59	40	99	40.40 %
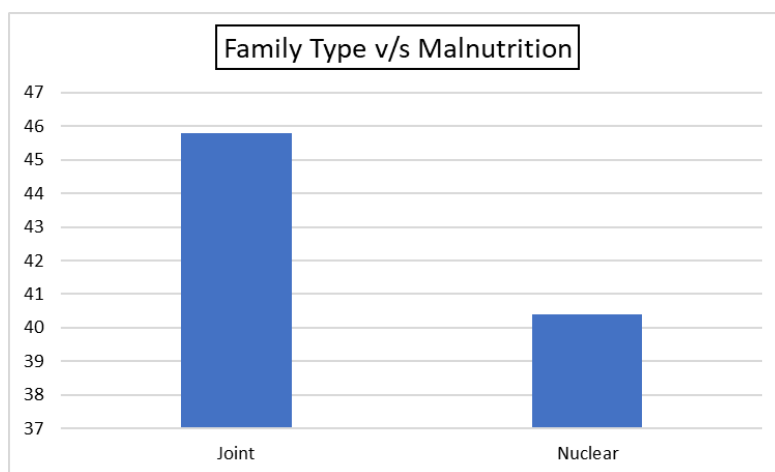
Interpretation :-

- Out of the whole sample of 182 youngsters, 83 came from joint households and 99 from nuclear families.

- Only 40.40 % of children from nuclear families were found to be stunted, compared to 45.78 % of children from joint families.

- There does not appear to be a correlation between malnutrition and the type of family a child is affiliated with because there is no discernible

difference in the percentages of undernourished children belonging to various types of households.

4.7 Birth Order

Table 11: Birth Order in Sample

Birth Order	Frequency	Percentage
1	88	48.35 %
2	48	26.37 %
3	26	14.28 %
4	19	10.44 %
5	1	0.55 %

* The survey involved a total of 88 (48.35 %) children who were born and 48 (26.37 %) children born second and as shown in the chart 4.7.
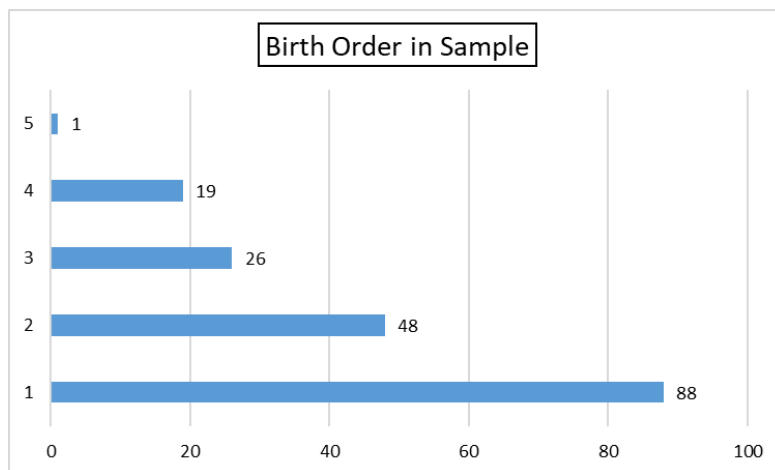
The nutritional status of children born at different times is as -

Table 12: Birth Order v/s Malnutrition

Birth Order	Fit	Malnourished	Malnourished %
1	52	36	40.91 %
2	30	18	37.50 %
3	16	10	38.46 %
4	6	13	68.42 %
5	-	1	100 %
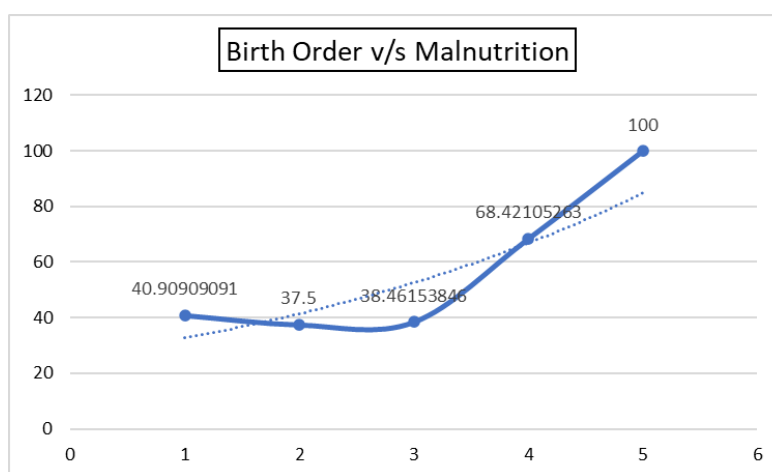
Interpretation :-

- The children born initially were the most numerous in the data, which included many children who were born in their families at various times.

- According to the table 12 and the graph 4.7, children born at various orders experienced malnutrition in different ways. The trend of under nutrition is linearly increasing with birth order.

5 Data Analysis and Interpretation

The information gathered from the test results and responses to the data was analysed, and the following results came to light. Additionally, Chi-Square testing was used to determine whether the attributes are correlated with child malnutrition. For all tests, the level of significance (α) is 5 %.

5.1 Gender v/s Malnutrition

* To test the association between Gender & Malnutrition, the null and alternate hypothesis for the test are :-

- **H_0 :** There is no significant association between gender and nutritional status of the child.

- **H_1 :** There is significant association between gender and nutritional status of the child.

Table 13: Contingency table for Gender v/s Malnutrition

Gender		Fit	Malnourished
Female	Observed	50	35
	Expected	48.57	36.42
Male	Observed	54	43
	Expected	55.43	41.57

Table 14: Chi-Square Table - 1

Degree of Freedom (*d. f.*)	(2 - 1)(2 - 1) = 1
$\chi^2_{\mathbf{Cal}}$	0.668
$\chi^2_{\mathbf{Tab}}$	0.00393

* **Interpretation :-**

- Since $\chi^2_{\mathbf{Cal}} > \chi^2_{\mathbf{Tab}}$, the null-hypothesis ($H_0$) is rejected.

- Hence, at 95 % confidence interval, we can conclude that - **"There is significant association between gender and nutritional status of the child."**

- The child's malnutrition is influenced by gender, and the two conditions vary depending on their own.

5.2   Age v/s Malnutrition

* To test the association between Age & Malnutrition, the null and alternate hypothesis for the test are :-

- **H_0 :**   There is no significant association between age and nutritional status of the child.

- **H_1 :**   There is significant association between age and nutritional status of the child.

Table 15: Contingency table for Age v/s Malnutrition

Age in Years ↓		Fit	Malnourished
0 - 1	Observed	9	5
	Expected	8	6
1 - 4	Observed	45	29
	Expected	42.28	31.71
5 - 8	Observed	42	29
	Expected	40.57	30.42
8 +	Observed	8	15
	Expected	13.14	9.86

* Interpretation :-

Table 16: Chi-Square Table - 2

Degree of Freedom (**d. f.**)	(4 - 1)(2 - 1) = 3
$\chi^2_{\mathbf{Cal}}$	0.137
$\chi^2_{\mathbf{Tab}}$	0.351

- Since $\chi^2_{\mathbf{Cal}} < \chi^2_{\mathbf{Tab}}$, the null-hypothesis ($H_0$) is accepted.

- Hence, at 95 % confidence interval, we can conclude that - **"There is no significant association between age and nutritional status of the child."**

5.3   Educational Status of Parents v/s Malnutrition

* To test the association between Educational Status of Parents & Malnutrition, the null and alternate hypothesis for the test are :-

- **H_0 :**   There is no significant association between Educational Status of Parents and nutritional status of the child.

- **H_1 :**   There is significant association between Educational Status of Parents and nutritional status of the child.

Table 17: Contingency table for Educational Status of Mother v/s Malnutrition

		Fit	**Malnourished**
Educated	Observed	91	65
	Expected	89.14	67
Illiterate	Observed	12	14
	Expected	14.86	11

   * Interpretation :-

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Table 18: Chi-Square Table - 3

Degree of Freedom (**d. f.**)	(2 - 1)(2 - 1) = 1
$\chi^2_{\mathbf{Cal}}$	0.24
$\chi^2_{\mathbf{Tab}}$	0.003932

- Since $\chi^2_{\mathbf{Cal}} > \chi^2_{\mathbf{Tab}}$, the alternate hypothesis (H_1) is accepted.

- Hence, at 95 % confidence interval, we can conclude that - **"There is significant association between Educational Status of Mother and nutritional status of the child."**

Table 19: Contingency table for Educational Status of Father v/s Malnutrition

		Fit	Malnourished
Educated	Observed	100	74
	Expected	99.43	75
Illiterate	Observed	3	5
	Expected	4.57	3.4

Table 20: Chi-Square Table - 4

Degree of Freedom (**d. f.**)	(2 - 1)(2 - 1) = 1
$\chi^2_{\mathbf{Cal}}$	0.260
$\chi^2_{\mathbf{Tab}}$	0.003932

* Interpretation :-

- Since $\chi^2_{\mathbf{Cal}} > \chi^2_{\mathbf{Tab}}$, the alternate hypothesis (H_1) is accepted.

- Hence, at 95 % confidence interval, we can conclude that - **"There is significant association between Educational Status of Father and nutritional status of the child."**

5.4 Parent's level of Education v/s Malnutrition

* To test the association between Parent's level of Education & Malnutrition, the null and alternate hypothesis for the test are :-

- **H$_0$:** There is no significant association between Parent's level of Education and nutritional status of the child.

- **H$_1$:** There is significant association between Parent's level of Education and nutritional status of the child.

Table 21: Contingency table for Mother's level of Education v/s Malnutrition

Educational Status		Fit	Malnourished
Illiterate	Observed	13	13
	Expected	14.86	11.14
10th	Observed	21	18
	Expected	22.28	16.71
12th	Observed	8	4
	Expected	6.85	5.14
Graduate	Observed	31	13
	Expected	25.14	18.86
Post Graduate	Observed	30	27
	Expected	32.57	24.43
PhD	Observed	1	3
	Expected	2.29	1.71

* Interpretation :-

- Since $\chi^2_{\text{Cal}} < \chi^2_{\text{Tab}}$, the null-hypothesis ($H_0$) is accepted.

Table 22: Chi-Square Table - 5

Degree of Freedom ($d.\ f.$)	(5 - 1)(2 - 1) = 5
$\chi^2_{\textbf{Cal}}$	0.2602
$\chi^2_{\textbf{Tab}}$	1.14547

- Hence, at 95 % confidence interval, we can conclude that - **"There is no significant association between Mother's level of Education and nutritional status of the child."**

- Therefore, based on our test, the mother's education degree has little to no impact on the nutrition of the child. They are actually independent of one another.

Now, contingency table based on father's level of education is as :-

Table 23: Contingency table for Father's level of Education v/s Malnutrition

Educational Status		Fit	Malnourished
Illiterate	Observed	4	4
	Expected	4.52	3.42
10$^{\text{th}}$	Observed	19	16
	Expected	19.80	15
12$^{\text{th}}$	Observed	15	14
	Expected	16.41	12.43
Graduate	Observed	28	16
	Expected	24.90	18.85
Post Graduate	Observed	36	28
	Expected	36.21	27.43
PhD	Observed	1	0
	Expected	0.56	0.43

Table 24: Chi-Square Table - 6

Degree of Freedom ($d.\ f.$)	(5 - 1)(2 - 1) = 5
$\chi^2_{\mathbf{Cal}}$	0.8836
$\chi^2_{\mathbf{Tab}}$	1.14547

* Interpretation :-

- Since $\chi^2_{\mathbf{Cal}} < \chi^2_{\mathbf{Tab}}$, the null-hypothesis ($H_0$) is accepted.

- Hence, at 95 % confidence interval, we can conclude that - **"There is no significant association between Father's level of Education and nutritional status of the child."**.

5.5   Family Type v/s Malnutrition

* To test the association between Family Type & Malnutrition, the null and alternate hypothesis for the test are :-

- **H_0 :**   There is no significant association between Family Type and nutritional status of the child.

- **H_1 :**   There is significant association between Family Type and nutritional status of the child.

Table 25: Contingency table for Family Type v/s Malnutrition

Family Type ↓		Fit	Malnourished
Joint	Observed	45	38
	Expected	47.43	35.57
Nuclear	Observed	59	40
	Expected	56.57	42.42

* Interpretation :-

Table 26: Chi-Square Table - 7

Degree of Freedom (*d. f.*)	(2 - 1)(2 - 1) = 1
$\chi^2_{\mathbf{Cal}}$	0.4651
$\chi^2_{\mathbf{Tab}}$	0.00393

- Since $\chi^2_{\mathbf{Cal}} > \chi^2_{\mathbf{Tab}}$, the alternate hypothesis (H_1) is accepted.

- Hence, at 95 % confidence interval, we can conclude that - **"There is significant association between Family Type and nutritional status of the child."**

- Family type affects a child's malnutrition, and the two circumstances change depending on one another.

5.6   Birth Order v/s Malnutrition

According to National Library of medicine, one of the key indicators of a child being stunted is the order of birth. After correcting for all other factors, stunting is 24 %, 30 %, and 72 % more probable in third order, fourth order, and fifth or higher order children. In addition to birth order, findings show that child age, size at birth, intention of birth, maternal education, body mass index, wealth index, place of residence, and access to mass media all have a significant impact on child malnutrition.

* To test the association between Birth Order & Malnutrition, the null and alternate hypothesis for the test are :-

- **H$_0$:**   There is no significant association between Birth Order and nutritional status of the child.

- **H$_1$:**   There is significant association between Birth Order and nutritional status of the child.

Table 27: Contingency table for Birth Order v/s Malnutrition

Monthly Income (in 000's)		Fit	Malnourished
1	Observed	52	36
	Expected	50.28	37.71
2	Observed	30	18
	Expected	27.42	20.57
3	Observed	16	10
	Expected	14.86	11.14
4	Observed	6	13
	Expected	10.86	8.15
5	Observed	0	1
	Expected	0.57	0.42

Table 28: Chi-Square Table - 8

Degree of Freedom ($d.\ f.$)	(5 - 1)(2 - 1) = 4
$\chi^2_{\mathbf{Cal}}$	0.1205
$\chi^2_{\mathbf{Tab}}$	0.7107

* Interpretation :-

- Since $\chi^2_{\mathbf{Cal}} < \chi^2_{\mathbf{Tab}}$, the null-hypothesis ($H_0$) is accepted.

- Hence, at 95 % confidence interval, we can conclude that - **"There is no significant association between Birth Order and nutritional status of the child."**

5.7   Monthly Family Income v/s Malnutrition

* To test the association between Monthly Family Income & Malnutrition, the null and alternate hypothesis for the test are :-

- **H_0 :**   There is no significant association between Monthly Family Income and nutritional status of the child.

- **H_1 :**   There is significant association between Monthly Family Income and nutritional status of the child.

Table 29: Contingency table for Monthly Family Income v/s Malnutrition

Monthly Income (in 000's)		Fit	Malnourished
4 - 15	Observed	32	25
	Expected	34.45	20.87
16 - 35	Observed	29	21
	Expected	30.22	20.88
36 - 75	Observed	25	15
	Expected	24.18	16.73
Above 75	Observed	24	15
	Expected	23.57	16.28

* Interpretation :-

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Table 30: Chi-Square Table - 9

Degree of Freedom (*d. f.*)	(4 - 1)(2 - 1) = 3
$\chi^2_{\textbf{Cal}}$	0.8974
$\chi^2_{\textbf{Tab}}$	0.3518

- Since $\chi^2_{\textbf{Cal}} > \chi^2_{\textbf{Tab}}$, the alternate hypothesis (H_1) is accepted.

- Hence, at 95 % confidence interval, we can conclude that - **"There is significant association between Monthly Family Income and nutritional status of the child."**

- Therefore, based on our test, the Monthly Family Income has significant impact on the nutrition of the child.

6 Limitations and Difficulties

6.1 Limitations

According to studies, malnutrition trends vary by location. However, due to logistical limitations, the offline survey could only be completed in the Gorakhpur region, and the remaining data was insufficiently representative of other regions of the nation, which led to an imprecise evaluation of the pertinent geological factor. Additionally, according to the data we have, there are more children than most who live better lives, which calls into question the report's overall veracity.

6.2 Difficulties

The survey required some information that is typically difficult to obtain from people. The parents' educational backgrounds or the child's birth order, is not something that someone would voluntarily give, so it was a bit challenge for me to get adequate data for the project. The major challenge in carrying out the project was getting sufficient data from the society and a significant number of respondents for the survey in the limited time.

7 Future scope of the Study

Research is never ending process. No research is perfect and this research is no exception. However, this chapter offers a thorough analysis of children's nutritional status and the key elements that have a substantial impact on them. In the future, removing the project's constraints and expanding the study's scope would make the findings more alluring.

8 Conclusion

Following an analysis of all 182 student's data, the following findings were made: -

- **Gender :** 35 of the 85 total females, or 41.17 %, were determined to be undernourished, whereas 44.32 % of the males were. Additionally, there was a strong correlation between child malnutrition and gender.

- **Age Category :** The percentage of children who were undernourished and the number of newborns under one year old were both somewhat low. The percentage of malnourished children between the ages of 1-4 and 5-8 also experienced an abrupt increase. The chi-square, however, did not provide any evidence of a relationship between the two parameters.

- **Educational Status of Parents :** A significant portion of the children in the study had parents with at least a high school diploma. Table 6 displays the percentage of children that are undernourished for various parent educational statuses. Additionally, a significant reliance on parents' educational level and child waste was observed.

- **Parent's Level of Education :** As can be observed in the graph 4.4, parents from a variety of educational backgrounds participated in the survey. In all situations, there was a nearly equal number of malnourished children, and there was no correlation between any of the factors and child malnutrition.

- **Monthly Family Income :** Children's nutritional status was greatly influenced by money (4.5), and a strong correlation was found between monthly income and nutritional status.

- **Family Type :** Family type was strongly related with malnutrition, with approximately comparable percentages of undernourishment

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across children from different family types (10, 26).

- **Birth Order :** Children born first were the most in the data and percentage of malnutrition of children decreased with increase in birth order (4.7, 4.7). Reports say that the malnutrition of children depends on the birth order but, our test showed that there was not any relation between theem and called them indepndent. (28)

According to the study's findings, children's nutritional status is significantly influenced by socioeconomic circumstances. The study looked at the effects of numerous variables, including birth order, parental education levels, family structure, gender, and age, on child malnutrition. The study's findings show a complicated interplay between various elements, with some of them playing a more important role than others.

The results indicate that coordinated efforts by governments, healthcare professionals, and families are required to address the underlying socioeconomic causes of child malnutrition. In addition to advancing gender equality and addressing cultural practises that can be detrimental to children's health, this entails enhancing access to healthcare, education, and employment opportunities.

Overall, this study offers insightful information on the intricate interplay of socioeconomic factors that cause child malnutrition. The results can guide programmatic and policy initiatives aiming at lowering health disparities and improving child nutrition outcomes.

9   Questionnaire

Assessment of the Socio-economic and Demographic Factors on Malnutrition of Children
QUESTIONNAIRE FORM

Date of Data Collection - ....   Questionnaire No - ....

Good nutrition is essential for a child's growth and development, and can be used as a proxy indicator of the health of a community. This project attempts to identify socioeconomic and demographic factors that affect children's nutritional status in various societal sectors and ascertain their impact.

Please provide the information to the fullest of your knowledge. Your data will be 100 % safe with us and will be used for research purpose only.
For any queries, please contact : tripathiratneshpati@gmail.com, ☎ +917571838414

1. What is the gender of the child ?

    (a) Male

    (b) Female

    (c) Others

2. What is the Date of Birth of the child ? ....

3. What is the birth order of the child ?

    (a) First Born

    (b) Second Born

    (c) Third Born

    (d) Fourth Born

    (e) Fifth or more

4. If it's your 2nd child or more, what is the birth interval between the older and younger sibling ? (in months) - ....

5. What is the weight of the child ? (in kgs) - ....

6. What according to you is the current nutritional status of the child ?

   (a) Underweight
   (b) Normal (FIT)
   (c) Overweight

7. What is the child's mother's highest level of education ?

   (a) 5th
   (b) 8rth
   (c) 10th
   (d) 12th
   (e) Graduation
   (f) Post-Graduation
   (g) Doctorate or more
   (h) ....

8. What is the child's father's highest level of education ?

   (a) 5th
   (b) 8th
   (c) 10th
   (d) 12th
   (e) Graduation
   (f) Post-Graduation

(g) Doctorate or more

(h) ....

9. What is your family type ?

   (a) Nuclear Family

   (b) Joint Family

10. What is the average family's monthly income ? (if not exact, please provide a rough idea)

   (a) 10,000 or below

   (b) 10,000 - 20,000

   (c) 20,000 - 40,000

   (d) 40,000 - 70,000

   (e) 70,000 or above

Thanks for giving us your valuable time. Your data will be completely safe with us.