



Impact of Socioeconomic Profile on Nutritional Status of School Children

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Objectives: To study the effect of socioeconomic factors such as birth order, family size, family type, parent's education level and family income on nutritional status of school children.

Methods: It was a cross sectional survey conducted at Madurai district, Tamil Nadu to assess the effect of socioeconomic factors on nutritional status of school going children age of 5-6 years belonging to different socio economic classes of the society. Systematic random sampling technique was applied to collect the sample. The interview schedule was used to collect the background information regarding caste, type of family, family size, number of children and educational status of parents, occupation and income. Body Mass Index in relation to WHO reference child growth standard was used for assessing nutritional status.

Results: Out of 60 children 30.00, 53.33 and 5.00 per cent children had mild, moderate and severe malnutrition respectively. Majority of malnourished children belonged to 3rd (51.66%) and 4th (30%) order of birth. The mild (28.33%) and moderate malnutrition (51.67%) children belonged to medium size family. The severely malnourished belonged to medium and large size family are 3.33 and 1.67 per cent respectively. Majority of the Mild (8.33%) moderate (23.33%) and severe

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(3.33%) malnutrition children belonged to mothers who were illiterate. Five per cent of children were severely malnourished and 18.33 per cent of children were moderately malnourished from the income range of ₹ 6000 to 7000.

Conclusion: The present study shows that the prevalence of malnutrition was significantly higher in school children age of 5-6 years. Poverty, low literacy rate, large families, women's education appears to be the important underlying factors responsible for poor nutritional status of children ($p < 0.05$). The malnutrition is higher in children of illiterate mothers because of lack of knowledge on importance of healthy diet.

Keywords: Malnutrition; socioeconomic; children; determinants; BMI.

1. INTRODUCTION

Globally, an estimated 230 million children are chronically malnourished, and more than half of under five deaths in children are attributable to malnutrition [1]. In India, 38 per cent of children under age five years are stunted which is a sign of chronic undernutrition. Twenty one percent of children under age five years are wasted, which is a sign of acute undernutrition, while 36 percent of children under age five years are underweight. Two percent of children are overweight. The prevalence of stunting in children under age five is the highest in Bihar (48%), Uttar Pradesh (46%), Jharkhand (45%), and Meghalaya (44%), and lowest in Kerala and Goa (20% each). Jharkhand has the highest levels of underweight (48%) and wasting (29%) [2]. Mothers' education level even within the same social class is a key determinant of their children's nutritional status. A high level of maternal education could lower childhood malnutrition through other pathways such as increased awareness of healthy behaviour, sanitation practices and a more equitable sharing of household resources in favour of the children [3,4]. Fifty-one percent of children born to mothers with no schooling are stunted, compared with 24 percent of children born to mothers with 12 or more years of schooling. The corresponding proportions of underweight children are 47 and 22 percent, respectively [2]. Father's education is another important determinant and has a positive impact on child health and nutritional status. Usually father is the main earner and decision maker of a family and so their higher level of education plays an important role to ensure better nutritional status of children [5]. The children from households with a low or very low socioeconomic status had 2.5 times the risk of being underweight relative to children who came from households with middle to upper socioeconomic status. The prevalence of stunting decreases steadily with an increase in wealth quintiles, from 51 percent of children in households in the

lowest wealth quintile to 22 percent of children in households in the highest wealth quintile [6]. In India past and present socioeconomic conditions were found to be the strongest predictors of child undernutrition [7]. Therefore, the socioeconomic status not only serves as one of the best global indicators of children's nutritional status, but also provides an indirect measurement of the quality of life of an entire population [8]. Hence, an attempt was undertaken to study the impact of socioeconomic factors on nutritional status of school children.

2. METHODOLOGY

2.1 Selection of Study Area

It was planned to conduct the study in semi-rural area. For the present study Loosi Bery Noble special girl's school at Moonrumavadi in Madurai district, Tamil Nadu was selected. The school was located within 2.0 km from MGR (Mattuthavani) bus stand of central Madurai.

2.2 Study Design

Sixty girl children in the age range of five to six year were selected. The socio-economic status of the children's household was assessed. The interview schedule was used to collect the background information regarding caste, type of family, family size, number of children and educational status of parents, occupation and income.

2.3 Inclusion Criteria and Exclusion Criteria

Inclusion criteria were girl children of age 5-6 years, those children whose parents were willing to participate in study. Exclusion criteria were children aged less than 5 years and more than 6 years, those Children with congenital diseases, history of metabolic diseases, chronic diseases, physical and mental impairment that could influence their growth. Children who were too

agitated and unwilling for anthropometric measurements were excluded from the study.

2.4 Anthropometric Measurements

The anthropometric parameters like height, weight, mid-upper arm circumference and waist hip ratio were measured to assess the nutritional status of the children [9]. Anthropometric indices were used to determine the children's nutritional status and was calculated using reference median recommended by the World Health Organization (WHO) and classified according to standard deviation (SD) units (Z-scores) based on the WHO criteria [10].

2.5 Statistical Analysis

The general information of study subjects were quantified, classified, tabulated and expressed in percentages. Data were analyzed using statistical software SPSS version 17.0. The Chi-square test was used for testing the significance of association between the socioeconomic characteristics and malnutrition.

3. RESULTS AND DISCUSSION

3.1 Socioeconomic Background of the Selected Children

Socioeconomic characteristics of the selected children were given in Table 1. Majority of the children (88.33 %) were belonging to backward class. About 8 per cent of children came from most backward class. Majority of the children (91.67%) were from Hindu families. Regarding the family size, it was found that 88.33 per cent of children belonged to a medium family size of 4 to 6 members. A large and small family size constitutes the rest of the percentage. The results obtained in present study are comparable to the findings of earlier workers [11]. The researchers stated that the majority of the respondents (61 %) had medium size family followed by small size (33 %) and large size (7 %). Chandrasekhar and Rani are also reported that the majority of the families (79%) had 3 to 5 family members. Majority of the children (80%) were belonging to nuclear family. Only few per cent of the children were belonging to joint family (20%) [12]. The findings of present study appeared to be in close agreement with [13] those reported that 67 per cent of the preschoolers belonged to nuclear family with family size of 3 to 5 members and rest were from joint family having 6-9 members. Amirthaveni and Barikor also reported that the majority of the

subjects (90.5%) belonged to nuclear families and 9.5 per cent to joint families [14]. Kumari and Singh stated that the 60 per cent of families were of nuclear type and 40 per cent of joint type [11]. The per cent of nuclear family was higher in the present study too. About 98.33 per cent of the children's families were belonging to non-vegetarian and 1.67 per cent belonged to vegetarian. Kumari and Singh found that 92 per cent of families were non-vegetarian whereas only eight per cent were vegetarian [11]. Kumar et al. [15] observed that 77.5 per cent of the respondents (11 to 13 year old) were non-vegetarian. In the present study, the picture was higher than the percentage stated by Kumar et al.

From the survey it was found that fathers of 70 per cent had education up to primary level. Majority of the mothers also studied up to primary level (43.33%). The researchers [11] studied the nutritional status of children belonging to scheduled caste. Results showed that the ninety five per cent of women respondents had no formal education whereas four per cent were educated up to middle and only one respondent was a graduate. Bagyalakshmi and Vijayalakshmi noted that 55 per cent of parents were illiterates [16]. In the present study, the illiterate level of parents was lower than the values quoted by Bagyalakshmi and Vijayalakshmi. Majority of the (65%) family members worked as non-agricultural labourers and rest of them engaged in agricultural activity (5%), professional (3.33%), artisans (8.33%), drivers (8.33%), electricians (1.67%) or tailors (5 %). Kumar et al. [15] opined that the occupations of the fathers of 11 to 13 years old student in Uttranchal as farming, service, small scale business and labour. Kumari and Singh stated that the three fourth of the families were engaged entirely as labourers. The rest were engaged as artisans, rickshaw-pullers and in other occupations [11]. Similar trend was observed in the present study. Majority of the (55%) children's family had a monthly income of Rs 6001-7000 and the rest of them constitute others. The research conducted by Amirthaveni and Barikor reported that majority of the subjects were from low income groups (38%), followed by 28 per cent high income group, 26 per cent middle income group and 8.0 per cent from the economically weaker [14]. Bhan and Kaur also stated that fifty seven per cent of the sample belonged to middle income group (\square 5, 000 / month) while 35 per cent belonged to lower income group (less than \square 5,000 / month) [13].

Table 1. Socioeconomic background of the selected children

S. No.	Name of the variable	Category	Frequency(n)	Percentage
1.	Social class	Forward caste	1	1.67
		Backward caste	53	88.33
		Most backward caste	5	8.33
		Scheduled caste	1	1.67
2.	Religion	Hindu	55	91.67
		Muslim	3	5.00
		Christian	2	3.33
3.	Family size	Below 4 (small)	5	8.33
		4-6 (medium)	5	88.33
		Above 6 (large)	2	3.33
4.	Type of family	Joint family	12	20.00
		Nuclear family	48	80.00
5.	Food habits	Vegetarian	1	1.67
		Non-vegetarian	59	98.33
6.	Educational status of fathers	Illiterate	8	13.33
		Primary education	42	70.00
		Secondary education	9	15.00
		College	1	1.67
7.	Educational status of mothers	Illiterate	21	35.00
		Primary education	26	43.33
		Secondary education	13	21.67
		Graduate		
8.	Occupation of the family members	Agriculture	3	5.00
		Labour	39	65.00
		Professional	2	3.33
		Artisan	5	8.33
		Driver	5	8.33
		Electrician	1	1.67
		Hotel server	2	3.33
		Tailor	3	5.00
9.	Monthly income of the family (₹)	6000-7000	14	23.33
		7001-8000	33	55.00
		8001-9000	6	10.00
		9000-10000	4	6.67
		> 10000	3	5.00

3.2 Birth History of the Selected Children

Majority of children (85 %) were born by normal delivery (Table 2). Majority of the children selected for this study were belonging to first (48.33 %) order of birth. The birth spacing was found to be 2 years in 60 per cent of children. Half of the children (50 %) had a birth weight of 2 to 2.5 kg. Only two of the selected children (3.33 %) had a birth weight of below 2.0 kg. Most of the children (65 %) did not receive any deworming tablets and health tonics.

3.3 Baseline Anthropometric Measurements

Anthropometric measurements are the important tools to picturize the nutritional status of the

individual. Anthropometric assessment of the selected children are presented in the Table 3. From the table it is inferred that anthropometric parameters of the children was lower than the standard level. The mean weight and height of the children were 14.30 kg and 106.30 cm respectively. Similarly, Chandrasekhar and George reported that the height and weight profile of 426 children in the age group of 0-6 years were below the standards [17]. Bhan and Kaur also revealed that the mean height and weight of the preschool boys were marginally less than the 50th percentile of NCHS standards [13]. Another author [18] also observed that the mean height was 15 to 20 per cent and mean weight was 40 to 50 per cent below that of the standards. The mean mid-upper arm circumference was 15.39 cm. Gowri and

Manjusha reported that the mid-upper arm circumference of the street children of age 8 to 9 years irrespective of sex ranged from 12.50 to 13.50 cm indicating moderate protein energy malnutrition [19]. Bhan and Kaur noted that the mean value of mid-upper arm circumference was 15.00 cm and 16.30 cm in the age group of 5 and 6 respectively [13]. Similar trend was noted in the present study too. The height for age was higher than the weight for age. The weight / height index of all the children were less than the normal standard value. The weight / height index of children was 0.134. The waist hip ratio of the

selected children was normal (0.79). From the results it was concluded that the central obesity was not present in the selected children. Chandrasekhar and Rani stated that children had weight / height ratio in the range of 0.131 to 0.146 which is less than the standard value [12]. Sachithanathan and Chandrasekhar [20] revealed that the height / weight index of the different age groups of the male and female population, studied was below the standard of 0.15 (ranged from 0.13 to 0.14). Similar observation was noted in the present study also.

Table 2. Birth history of the selected children

S. No.	Name of the variable	Category	Frequency (n)	Percentage
1.	Nature of delivery	Normal	51	85.00
		Caesarian	9	15.00
2.	Order of birth	First	29	48.33
		Second	24	40.00
		Third	6	10.00
		Fourth	-	-
		Fifth	1	1.67
3.	Spacing of pregnancy	One	11	18.33
		Two	36	60.00
		Three	9	15.00
		Four	2	3.33
		Five	-	-
		Six	1	1.67
4.	Birth condition	Pre term	-	-
		Post term	2	3.33
		Normal	58	96.67
5.	Birth weight	Below 2	2	3.33
		2 - 2.5	30	50.00
		2.5 - 3.0	15	25.00
		Above 3	13	21.67
6.	Deworming	Yes	21	35.00
		No	39	65.00
7.	Vitamin A and Iron tablet supplementation	Yes	15	25.00
		No	45	75.00

Table 3. Mean baseline anthropometric measurements of the selected children

Anthropometric parameters	Measurements
Weight (kg)	14.30 ± 2.32
Height (cm)	106.30 ± 5.53
Body Mass Index (BMI)	12.66± 2.01
Mid upper arm circumference (cm)	15.39 ± 1.12
Waist hip ratio	0.79 ± 0.04
Weight for age (% of standards)	77.45 ± 10.21
Height for age (% of standards)	96.74 ± 6.82
Weight / height index	0.134 ± 0.02

Table 4. Effect of birth order on nutritional status of selected children

Degree of malnutrition	1 st		2 nd		3 rd		4 th		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Normal (-2SD to <1SD)	5.00	8.33	2.00	3.33	-	-	-	-	7.00	11.67
Mild (-2 SD to<-1SD)	1.00	1.67	-	-	11.00	11.0	6.00	10.00	18.00	30.00
Moderate (< -2SD to > -3SD)	1.00	1.67	2.00	3.33	20.00	33.33	9.00	15.00	32.00	53.33
Severe (<-3SD)	-	-	-	-	-	-	3.00	5.00	3.00	5.00
Total	7.00	11.67	4.00	6.66	31.00	51.66	18.0	30.00	60.00	100.0

Chi- square value (χ^2) =16.92, df =9, p-value = 0.0500

Table 5. Effect of type of family on nutritional status of selected children

Degree of malnutrition	Nuclear		Joint		Total	
	No.	%	No.	%	No.	%
Normal (-2SD to <1SD)	7.00	11.67	-	-	7.00	11.67
Mild (-2 SD to<-1SD)	15.00	25.00	3.00	5.00	18.00	30.00
Moderate (< -2SD to >3SD)	26.00	43.33	6.00	10.00	32.00	53.33
Severe (<-3SD)	-	-	3.00	5.0	3.00	5.00
Total	48.00	80.00	12.00	20.0	60.00	100

Chi- square value (χ^2) =7.82, df =3, p- value = 0.0499

Table 6. Effect of size of family on nutritional status of selected children

Degree of malnutrition	Small		Medium		Large		Total	
	No.	%	No.	%	No.	%	No.	%
Normal (-2SD to <1SD)	4.00	6.67	3.00	5.00	-	-	7.00	11.67
Mild (-2 SD to<-1SD)	1.00	1.67	17.00	28.33	-	-	18.00	30.00
Moderate (< -2SD to > -3SD)	-	-	31.00	51.67	1.00	1.67	32.00	53.33
Severe (<-3SD)	-	-	2.00	3.33	1.00	1.67	3.00	5.00
Total	5.00	8.33	53.0	88.33	2.00	3.33	60.00	100.0

Chi- square value (χ^2) =12.59, df =6, p- value = 0.0500

Table 7. Effect of education of mother on nutritional status of selected children

Degree of malnutrition	I		P		S		G		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Normal (-2SD to <1SD)	-	-	2.00	3.33	5.00	8.33	-	-	7.00	11.67
Mild (-2 SD to<-1SD)	5.00	8.33	6.00	10.00	7.00	11.67	-	-	18.00	30.00
Moderate (< -2SD to > -3SD)	14.00	23.33	18.00	30.00	-	-	-	-	32.00	53.33
Severe (<-3SD)	2.00	3.33	-	-	1.00	1.67	-	-	3.00	5.00
Total	21.00	35.00	26.00	43.33	13.00	21.67	-	-	60.00	100.0

Chi- square value (χ^2) =16.92, df =9 p- value = 0.0500 I-Illiterate, P-Primary education, S- Secondary education and G- Graduat

Table 8. Effect of education of father on nutritional status of selected children

Degree of malnutrition	I		P		S		G		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Normal (-2SD to <1SD)	-	-	2.00	3.33	4.00	6.67	1.00	1.67	7.00	11.67
Mild (-2 SD to<-1SD)	2.00	3.33	12.00	20.00	4.00	6.67	-	-	18.00	30.00
Moderate (< -2SD to > -3SD)	5.00	8.33	27.00	45.00	-	-	-	-	32.00	53.33
Severe (<-3SD)	1.00	1.677	1.00	1.67	1.00	1.67	-	-	3.00	5.00
Total	8.00	13.33	42.00	70.00	9.00	15.00	1.00	1.67	60.0	100.0

Chi- square value (χ^2) =16.92, df =9 p- value = 0.0500 I-Illiterate, P-Primary education, S- Secondary education and G- Graduate

Table 9. Effect of family income on nutritional status of selected children

Degree of malnutrition	Income (₹)										Total	
	6000-7000		7001-8000		8001-9000		9001-10000		>10000		No.	%
	No.	%	No.	%	No.	%	No.	%	No.	%		
Normal (-2SD to <1SD)	-	-	2.00	3.33	-	-	2.00	3.33	3.00	5.00	7.00	11.67
Mild (-2 SD to<-1SD)	-	-	10.00	16.67	6.00	10.00	2.00	3.33	-	-	18.00	30.00
Moderate (< -2SD to > -3SD)	11.00	18.33	21.00	35.00	-	-	-	-	-	-	32.00	53.33
Severe (<-3SD)	3.00	5.00	-	-	-	-	-	-	-	-	3.00	5.00
Total	14.00	23.33	33.00	55.00	6.00	10.00	4.00	6.67	3.00	5.00	60.00	100.0

Chi- square value (χ^2) =21.03, df =12 p- value = 0.0499

3.4 Factors Affecting Nutritional Status of the Selected Children

3.4.1 Birth order

Table 4 depicts the effects of birth order on nutritional status of selected children. Majority of children from mild malnutrition belonged to 3rd (18.33 %) and 4th (10 %) order of birth in both groups, similar trend was observed in case of moderate malnutrition. Severe malnourished children (5 %) belonged to 4th order of birth. From these results, it can be concluded there is significant association between the birth order and the nutritional status of the selected children ($p < 0.05$). A research conducted by Behrman [21] stated that there are a number of reasons why birth order may affect the nutrient status of the children by the allocation of available foods. The researcher developed a model to estimate critical parameters of parental preferences regarding the allocation of nutrients among their children. Latent variable estimates for rural south India indicate that parental preferences have productivity-equity tradeoffs and parents favor older children. The productivity equity tradeoff, however, is much less for the lean season. Therefore, when food is scarcest, parents follow more closely a pure investment strategy, exposing their more vulnerable children to greater malnutrition risk.

3.4.2 Type of family

Table 5 shows the effect of type of family on nutritional status of the selected children. Majority of mild (25%) and moderate (43.33%) malnutrition children belonged to nuclear family. Most of severe malnutrition children (5.0 %) were from joint family. There may be more members to share the available food in the family. Often it is observed that there are only one or two earning members while size of dependents is very large. The study shows that there is a significant association between type of family and degree of malnutrition. The findings of present study is agree with [22] who reported that the Prevalence of underweight was 50.9% in nuclear and 49.1% in joint family children of 0-6 year's age group. The association observed between underweight and type of family was significant ($p = 0.000001$).

3.4.3 Size of family

The children from small and medium family size belonged to normal nutrition category are 6.67 and 5.0 per cent respectively (Table 6). Majority

of the mild (28.33 %) and moderate malnutrition (51.67 %) children belonged to medium size family. The severely malnourished belonged to medium and large size family are 3.33 and 1.67 per cent respectively. No one from the small size family was suffered from severe malnutrition. Abidoye and Randle reported that the two groups of 50 children age of seven to nine year old, from a private and public school in Nigeria [23]. The prevalence of malnutrition in public and private school were 48 and 74 per cent respectively. Although all the children had three meals daily, family type and size have influenced the amount of food eaten. Educational level of the mother and occupation of the father had significant association with nutritional status of children ($p < 0.05$).

3.4.4 Educational status of the parents

Majority of the Mild (8.33 %) moderate (23.33 %) and severe (3.33 %) malnutrition children belonged to mothers who were illiterate (Table 7). Large number of mild malnutrition children (11.67 %) also belonged to mothers who had received education up to high school. Results indicated that maternal education is a very important factor in maintaining the good health and nutritional status of a child. Maternal education showed statistically significant association with childhood malnutrition. Literate mothers can influence nutrition status of their children by challenging traditional beliefs and attitudes, leading to a greater willingness to accept developmental initiative and utilize modern healthcare. Beneficial effects of maternal education have been observed to be more significant in case of sufficient but not abundant resources. Majority of the children who suffer from mild (12.0 %) and moderate (27.0 %) malnutrition their fathers studied up to primary level (Table 8). Paternal literacy level is indirectly associated with child nutritional status. Father's education may be important because he plays vital role in certain health seeking decisions and household income in our social set up. The results showed that 23.33 (mild), 48.33 (moderate) and 3.33 per cent (severe) children of fathers who received education up to primary school were malnourished as compare to 6.67 (mild) and 1.67 per cent (severe) children of fathers' educated above primary school. The findings of present study is agree with [24] who reported that large number of well-nourished infants belonged to mothers who were in high school and above category, while in case of undernourished and moderately undernourished,

almost all belonged to mothers who were illiterate. Babar et al. [25] also stated that 42.25 per cent children of illiterate mothers and 20 per cent children of literate mothers had BMI value less than 5th centile ($p < 0.05$). BMI values were negatively correlated to mothers' education. Only 19.5% children of literate fathers' had BMI value less than 5th centile where as 50.9% children of illiterate fathers' were under nourished ($p < 0.05$).

3.4.5 Family income

Most of the children (35 %) in the category of moderate malnutrition belonged to the income level range from ₹ 7001-8000 (Table 9). Five per cent of children were severely malnourished 18.33 per cent of children were moderately malnourished from the income range of ₹ 6000-7000. The study conducted by Eswaran and Poorni observed that the selected families in Kolli hills and Pichaimalai hills belonging to low income groups and with low literacy level spent 80 to 90 per cent of their income on food [26]. All the children had low haemoglobin levels (7.89 %) indicating that low income and low literacy level affected the food intake of the family especially the children. Another research [24] who reported the factors affecting the nutritional status of selected rural infants in Haryana. The results revealed that 12 out of 19 well-nourished infants belonged to higher income group followed by 6 infants from middle income group. Majority of undernourished infants belonged to low income group. It can be inferred from the results that the income of family has great influence on nutritional status of an infant as most of the infants of low income group were under-nourished and most of the high income group infants were well-nourished. Rahman and Rao confirmed the variations in dietary pattern and nutrient intakes by economic status. The results showed that the intake of all nutrients were significantly lower in lower income group families than in middle, upper middle and high income group families [27]. Sangeetha and Yegammai studied the growth pattern of selected infants from different socio-economic groups. The study revealed that there was an energy and protein deficit during the fourth, fifth, sixth and seventh month of the infants belonging to low income, whereas no deficit seen in middle and high income [28]. Similarly, Khosla et al. [29] evaluated that the height and weight of 76 preschool children aged 1-4years belonging to low income families of urban slum area of Ludhiana city were below the standard value.

4. CONCLUSION

The present study shows that the prevalence of underweight was significantly higher in school children of 5-6 years of age. Poverty, low literacy rate, large families, women's education appears to be the important underlying factors responsible for poor nutritional status of children. The malnutrition is higher in children of illiterate mothers because of lack of knowledge on importance of healthy diet. The extent of malnutrition can be countered by educating the parents with respect to basic nutritional requirements of their children and encouraging them to consume locally available low cost nutritious foods. Educating the child along with providing meals which complement the child's diet, thus improving their nutritional status. Maternal education, nutrition education program especially for mothers and school children are few interventions and tools to bring about change in child nutritional status.

CONSENT

As per international standard, parental written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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