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Child Malnutrition In Punjab: Evidences From National Family Health Survey Rounds

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ABSTRACT
Malnutrition is often puzzled as undernourishment but it includes undernutrition and over-nutrition. In simple words it means bad diet. In India, child malnutrition is a key public health problem and have a lot of inter-state variations. In case of Punjab, mixed picture of child malnutrition emerges as on the one hand, the proportion of stunted children is high. On the other hand, the proportion of obese children is rising. The present study is based upon unit level secondary data of National Family Health Survey and utilises data of three rounds (2005-06, 2015-16, 2019-21). Around 25 percent, 11 percent, and 17 percent of children were stunted, wasted, and underweight in Punjab. The proportion of wasted, stunted and underweight children had gone down in Punjab, however, the proportion of overweight children has increased in Punjab. The chi-square test statistic reveals that economically weak households have higher proportion of stunted, wasted and underweight children and economically better-off households have higher proportion of obese children in Punjab. The children of Punjab are impacting by twofold setback of menace of malnutrition, therefore, the nutrition policies and health programs of Government of Punjab needs major investment and revamping to curb the child malnutrition.
Keywords: stunting, wasted, undernutrition, malnutrition, obesity

Introduction

Malnutrition, is often puzzled as undernutrition or undernourishment, however, World Health Organisation consider malnutrition a condition resulting from eating a diet with not enough or too much nutrients. The nutrients can involve calories, carbohydrates, minerals, proteins, or vitamins. In simple words, malnutrition means *"bad diet"*. Undernutrition may lead to low-weight and/or low-height and/or in number of acute and chronic health conditions in individuals. However, overnutrition may also lead to obesity and/or in number of acute and chronic health conditions (United Nations Systems: Standing Committee on Nutrition, 2015; World Bank, 2006). In India, malnutrition among under-five children is a key public health problem. This is evident from the fact that the occurrences of under-weight children in India is among the highest in the world, and is nearly double that of Sub-Saharan Africa (Murarkar et al., 2020). Also, that the malnutrition menace in India is a concentrated phenomenon which implies that a relatively small number of states, districts, and villages bear a large share of the malnutrition burden. There are only 5 states and 50 percent of villages which account for around 80 percent of the malnutrition burden (Gragnolati et al., 2006). Hence, it is essential for the health departments to detect malnutrition at an early stage so that timely interventions can be successfully planned and implemented. There is significant variation in nutritional status across states of India which makes the problem of malnutrition highly complex. Eight states namely Uttar Pradesh, Bihar, Jharkhand, Chhattisgarh, Meghalaya, Gujarat, Madhya

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Pradesh have stunting rates exceeding national average whereas Goa and Kerala have the lowest stunting rates with 19.4 and 21.3 percent. States where wasting is prominent and exceeds national average of 15.1 percent are West Bengal, Goa, Kerala, Jharkhand, Andhra Pradesh, Madhya Pradesh, Karnataka, Odisha, Maharashtra, Gujarat and Tamil Nadu. The proportion of children under the age of five years who are undernourished varies between 14.1 percent in Manipur to 42.1 in Jharkhand. Severe underweight is there between 2 percent in Goa to 16.8 percent in Tripura (Government of India, 2015). Currently, in Punjab, the recent findings of National Health and Family Survey (NFHS-5) portrays the mixed picture of Punjab's child nutritional status. The present study is dedicated to this cause. More specifically, the objective of the study is to examine the extent of child malnutrition of Punjab and its association with socio-economic characteristics of household.

Data and Methodology

The data on child malnutrition has been collected under various surveys and programs of Government of India and there are no consistent and comparable data available to study the state-wise dynamics of child malnutrition in India over a long period of time. Nevertheless, NFHS-3 (2968 households), NFHS-4 (16449 households), NFHS-5 (18824 households) rounds can be comparable and therefore are utilized to explore the dynamics of child malnutrition in Punjab. Information in these NFHS surveys has been collected on demographic, health status, and education of mothers as well as socio-economic characteristics of household. Furthermore, there are four methods to study malnutrition namely, Bio-chemical, clinical, dietary, and anthropometric. Keeping in view of type and nature of data collected for children of Punjab in NFHS surveys, anthropometry method is utilised to measure malnutrition. Initially, commonly used and internationally recognised growth standards like World Health Organisation's child growth standards 2006 for weight and height were employed to measure proportion of underweight, stunting, and wasted children (World Health Organization, 2006). In National Family Health Surveys, the information on weight and height (standing for children 2 to 5 years and length/lying for children aged 0 to 2 years) is collected for children below 5 years of age in NFHS-3, NFHS-4, and NFHS-5. Using the information of weight and height, z-score standard deviation for each child were calculated in the NFHS as per WHO recommendation for height/age, weight/age, weight/height and BMI. The stunted, wasted and underweight children are defined as follows:

Table 1: Definition/calculation of malnutrition in Punjab

Variable	Measurement
Stunted	Height/age standard deviation less than -2
Wasted	Weight/height standard deviation less than -2
Underweight for age	Weight/age standard deviation less than -2
Overweight	Weight/height standard deviation more than 2
Overweight for age	Weight/age standard deviation more than 2

Source: Modified from (World Health Organization, 2006)

The dynamics of children malnourishment were explored by tabular and compounded annual growth rates has been calculated. The association of child malnutrition and economic status is explored by Chi-square statistics.

Results and Discussion

As discussed earlier, detailed information on height, weight, age, and malnutrition was collected for children aged 0-5 years during various round of National Family Health Survey (NFHS). Furthermore, in 2006 WHO published the child growth standards for attained height and weight. Therefore, in the present analysis, these recommended standards have been

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utilised and data of NFHS-3, NFHS-4, and NFHS-5 has been utilised rigorously. It is evident from the table 2 that the proportion of stunted children in Punjab has gone down from 36.54 percent to 25 percent from 2005-06 to 2019-21. Almost one out of three children were stunted in 2005-06 in Punjab and now in 2019-21 as per NFHS-5 findings one in four children are stunted. Stunted children or too short for their age signify chronic undernutrition. It is evident from the figure that chronic undernutrition in Punjab has done down from 2005-06 to 2015-16 by annual rate of 3.6 percent. However, the decline in proportion of stunted children in Punjab from NFHS-4 to NFHS-5 has been marginal/negligible.

Table 2: Nutrition status of children in Punjab from 2005 to 2019

	NFHS-3/ 2005-6	NFHS-4/ 2015-16	NFHS-5/ 2019-21	CAGR NFHS-3 to NFHS-4	CAGR NFHS-4 to NFHS-5	CAGR NFHS-3 to NFHS-5
Stunted	36.54	25.38	25.6	-3.6%	0.2%	-2.3%
Wasted	8.91	15.46	10.7	5.7%	-7.1%	1.2%
Underweight for age	24.71	21.30	17.7	-1.5%	-3.6%	-2.2%
Overweight	1.41	2.31	4.23	5.1%	7.6%	12.9%
Overweight for age	0.53	0.80	1.57	4.2%	7.5%	14.4%
Number of children	1133	4746	4887	--	--	--

Note:

1.The estimates are based upon WHO 2006 International Reference Population guidelines to calculate the Nutritional status.

2. Compound Annual Growth Rate (CAGR) is calculated for 10 years for NFHS-3 to NFHS-4, for 15 years for NFHS-3 to NFHS-5, for 5 years for NFHS-4 to NFHS-5.

Source: Unit level data (International Institute for Population Sciences & ICF, 2007, 2017, 2021)

The proportion of wasted children in Punjab increased from 8.91 percent to 15.46 percent in the year 2005-06 to 2015-16 and then declined to 10.7 percent in 2019-21. The stunted children depict chronic undernutrition and wasted children depict acute undernutrition. It seems that chronic undernutrition has declined or at least did not increase in Punjab. However, acute undernutrition increased from NFHS-3 to 4 but the data of NFHS-5 reveals that it has declined in case of Punjab. The pattern of underweight children also reveals interesting pattern about the nutrition status of children of Punjab. The proportion of underweight children (for age) has declined from 24.71 to 21.30 and to 17.7 percent in 2005-06 to 2015-16 and then to 2019-21 at the rate of 2.2 percent per annum.

The proportion of overweight children has increased in Punjab from 1.41 percent (2005-06) to 2.31 percent (2015-16) and then to 4.23 percent (2019-21) at 12.9 percent per annum from 2005-06 to 2019-21. The proportion of overweight for age children has increased in Punjab from 0.53 percent (2005-06) to 0.80 percent (2015-16) and then to 1.57 percent (2019-21) at 14.4 percent per annum from 2005-06 to 2019-21. This signifies that obesity among children (overweight for age as well as height) has increased from 2005-06 to 2019-21. The findings of NFHS-5 (2019/21) also highlight that obesity has increased in all the states of India (International Institute for Population Sciences & ICF, 2021). The phase 2 data of NFHS-5 were collected after Covid-19 pandemic. It is comprehended that due to Covid-19 and

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lockdowns, the children and adults in the lockdown adopted unhealthy food habits and lifestyle.

The household income or economic status can be a crucial factor impacting malnutrition. The empirical evidence all over the globe suggest that households with better income, assets, and resources significantly impact child nutrition status (Alderman et al., 2006; Chowdhury et al., 2016; Freedman et al., 2006; Ghosh, 2020; Hackett et al., 2009; Haddad et al., 2003; Lokshin et al., 2005; Martin et al., 2004).Therefore, the association between economic status of household and child malnutrition of Punjab is studied.

Table 3: Economic status and nutrition status of children in Punjab from 2005 to 2019: Chi-square test

NFHS-5/ 2019-21										
Economic Status	Not Stunted	Stunted	Not wasted	Wasted	Not Underweight	Underweight	Not Overweight	Overweight	Not Overweight age	Overweight age
Poorest	20.35	36.29	23.76	30.53	21.61	37.34	24.76	18.80	24.71	12.05
Poorer	21.78	22.70	21.92	22.90	21.51	24.40	22.20	18.80	22.07	19.28
Middle	21.51	18.39	20.58	22.52	21.32	19.07	20.93	16.92	20.94	12.05
Richer	19.39	14.31	18.51	13.74	19.26	11.35	17.64	25.94	17.83	27.71
Richest	16.97	8.31	15.22	10.31	16.30	7.83	14.48	19.55	14.44	28.92
χ^2 Statistics (p-value)	162.07(0.00)		23.40(0.00)		138.44(0.00)		20.90(0.00)		24.79(0.00)	
NFHS-4/ 2015-16										
Economic Status	Not Stunted	Stunted	Not wasted	Wasted	Not Underweight	Underweight	Not Overweight	Overweight	Not Overweight age	Overweight age
Poorest	20.76	33.44	22.91	29.84	21.07	34.72	24.05	20.91	24.07	13.16
Poorer	21.46	23.49	21.78	23.02	21.18	24.93	22.24	10.91	22.07	10.53
Middle	20.42	16.93	19.67	18.80	20.27	16.82	19.50	20.91	19.50	23.68
Richer	21.24	14.94	20.36	15.67	21.29	13.55	19.69	17.27	19.65	18.42
Richest	16.13	11.20	15.28	12.67	16.20	9.99	14.52	30.00	14.72	34.21
χ^2 Statistics (p-	100.43(0.00)		22.90(0.00)		116.58(0.00)		24.47(0.00)		14.15(0.00)	

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value)										
NFHS-3/ 2005-06										
Economic Status	Not Stunted	Stunted	Not wasted	Wasted	Not Underweight	Underweight	Not Overweight	Overweight	Not Overweight age	Overweight age
Poorest	1.67	3.62	2.23	3.96	1.76	4.29	2.42	0.00	2.40	0.00
Poorer	5.42	10.14	6.40	14.85	5.04	13.57	7.07	12.50	7.10	16.67
Middle	12.80	24.15	16.57	20.79	14.30	25.00	17.19	0.00	17.04	0.00
Richer	26.56	38.65	30.23	38.61	29.19	36.43	31.24	12.50	31.14	0.00
Richest	53.55	23.43	44.57	21.78	49.71	20.71	42.08	75.00	42.32	83.33
χ^2 Statistics (p-value)	100.80(0.00)		24.65(0.00)		86.56(0.00)		9.59(0.04)		6.16(0.19)	

Source: Unit level data (International Institute for Population Sciences & ICF, 2007, 2017, 2021)

It is evident from the table 3 and Chi-square test statistics that there is association between economic status of the household and stunted, wasted and overweight children in the year 2005-06, 2015-16, 2019-21. Among the stunted and non-stunted children, it can be observed that large proportion of stunted children belonged to poorest, poorer and middle households in the year 2019-21 and 2015-16. The same pattern is observed for wasted and underweight children. In the year 2005-06, the proportion of stunted, wasted and underweight children belonging to poorest, poorer households is low, but in comparison to non-stunted children, it is relatively high. The same pattern is observed for wasted and underweight children. The empirical evidences elsewhere suggest that the household income or economic status is crucial factor impacting obesity (Alderman et al., 2006; Chowdhury et al., 2016; Freedman et al., 2006; Ghosh, 2020; Hackett et al., 2009; Haddad et al., 2003; Lokshin et al., 2005; Martin et al., 2004). Therefore, the association between economic status of household and obesity among children of Punjab is studied. It is evident from the table 3 and Chi-square test statistics that there is association between economic status of the household and overweight and overweight for age in the year 2015-16 and 2019-21. Among the overweight and overweight for age children, it can be observed that large proportion of overweight children belonged to richer and richest households in the year 2015-16 and 2019-21. In the year 2005-06, the proportion of overweight children belonging to richer and richest households is high, but not significant in case of overweight for age.

Conclusion

From the above discussion, it is evident regarding the status of child malnutrition in Punjab that even after many schemes, programs, and Government initiatives, around 25 percent, 11 percent, and 17 percent of children of children (0-5 years) were stunted, wasted, and underweight in Punjab. The proportion of stunted and underweight children had gone down in Punjab from 2005/6 to 2019-21. The proportion of wasted children increased from 2005-06

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to 2015-16 and then declined from 2015-16 to 2019-21. Obesity among children (overweight for age as well as height) has increased from 2005-06 to 2019-21 at the rate of 12.9 to14.4 percent per annum. Furthermore, the association of economic status and malnutrition also suggest that poor households have more malnutrition children and economically better-off households have more proportion of obese children. This signifies that nutrition status of children in Punjab has improved from NFHS-4 to NFHS-5. The sustainable development goal of ending hunger and all forms of malnutrition like stunting, wasting, and underweight completely by 2030 seems unlikely for India in general and for Punjab in particular (Mathur, 2021). The recent low per capita spending on the social sector in Punjab or low social sector expenditure to total expenditure in Punjab with few exception years in the recent past may elude the Government of Punjab from reaching the target of zero malnutrition (Reserve Bank of India, 2021; Tribune News Service, 2021). Furthermore, phase 2 data of NFHS-5 were collected after Covid-19 pandemic. It is comprehended that due to Covid-19 and lockdowns, the nutrition related services were hit and this may have or may aggravate the child malnutrition especially among the vulnerable sections of the society (Nguyen et al., 2021). Therefore, the nutrition policies and health programs to tackle the malnutrition needs major investment and revamping from Government of Punjab to curb the menace of malnutrition in Punjab.

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