TOPIC: Confronting a Silent Epidemic: Child Nutrition Dynamics in India through Women's Empowerment

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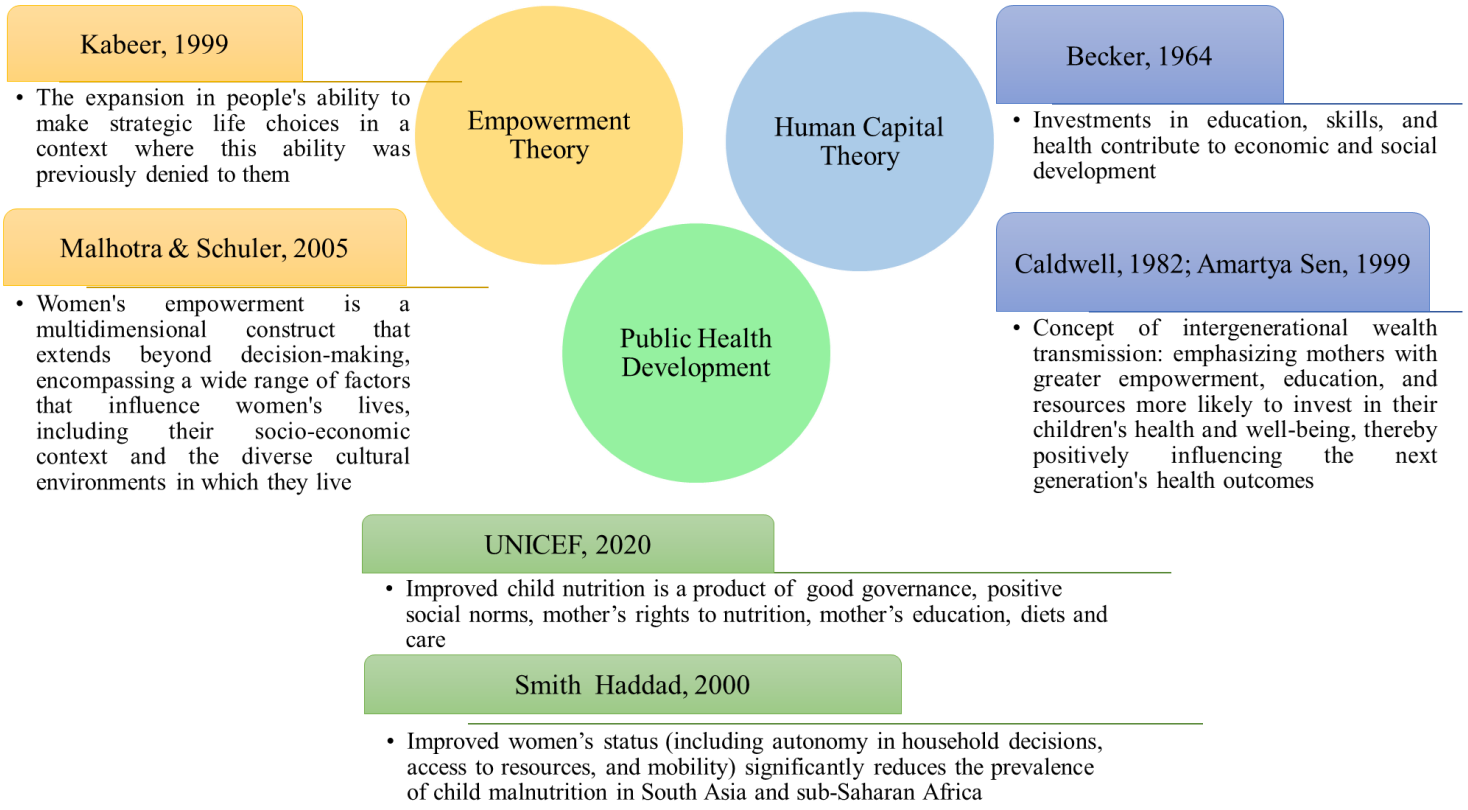
BACKGROUND: Malnutrition remains a pressing global issue, particularly in low and middle-income countries, where nearly 50% of children suffer from undernutrition [(1)]. Undernutrition is a leading cause of child mortality and contributes to long-term adverse effects on development [(2)]. In India, the fifth National Family Health Survey (NFHS-5) revealed that 35.5% of children under five are stunted, 19% are wasted, and 33% are underweight, highlighting the scale of the crisis. Researchers consistently show that children's nutritional outcomes are closely tied to maternal well-being and empowerment [(3)]. Mother's decision-making, education, and health have been identified as a key determinant in improving child health outcomes [(4–6)]. However, the nuanced relationship between women's empowerment and child nutrition outcomes in India requires deeper exploration. Hence, this study aims to construct a composite index of women's empowerment using six dimensions and investigates its impact on child nutrition from 2006 to 2021 in India.

THEORETICAL FOCUS: This research work is based on three pillars: women's empowerment, human capital theory and public health development [(7–13)]: -



DATA: This study is based on three recent National Family Health Survey rounds (NFHS 3, NFHS 4, and NFHS5).

RESEARCH METHODS:

Target Population: We have taken children under the age of five who live with their mothers (ages 15-49 years). Mothers should be currently married or living in a union, not pregnant, and fall under the state module of NFHS.

Variables

Dependent variable: The three anthropometric indicators were used weight-for-height (wasting), height-for-age (stunting) and weight-for-age (underweight) of 2 standard deviations (SD) or more below the corresponding median of the reference population, respectively.

Independent Variable: *Women's Empowerment***:** Six dimensions are taken to explain women's empowerment: decision-making, attitude towards violence, freedom of movement, perceived sexual rights, financial independence and societal norms.

Background Variables: Child's age in months, sex of the child, birth order, size at birth, Women's age, women's education, husband's education, use of contraceptives, mass media exposure, Wealth, community, religion, place of residence, region,

Statistical Methodology: The Kaiser–Meyer–Olkin (KMO) test of sampling adequacy has been used before constructing a composite index of women's empowerment using Confirmatory Factor Analysis. kernel density plots to understand the distribution of stunting, wasting and overweight, along with linear polynomial graphs, which facilitated an understanding of how these parameters evolve concerning the child's age. Further, binary logistic regression and multilevel analysis were conducted to identify association and vulnerable levels (State-level, PSU-level, and household-level) that impact undernutrition. This approach accounts for hierarchical data structures and allows for the examination of factors at multiple levels, providing a comprehensive understanding of the determinants of child undernutrition.

FINDINGS:

Figure 1: Kernal Density Plot For HAZ, WHZ WAZ for children under age five, NFHS3, NFHS4, and NFHS5, India

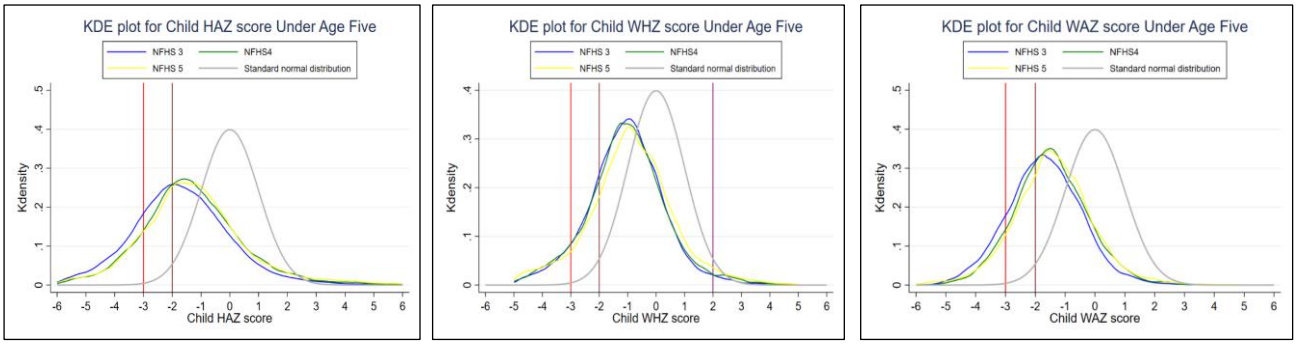


Figure 1 presents the kernel density plot revealing that the prevalence of stunting decreased from NFHS 3 to NFHS 5. While NFHS 4 and NFHS 5 had similar densities of severely stunted cases (below -3 standard deviations from the median of the reference population), NFHS 5 showed a lower density of chronically undernourished cases (below -2 SD) than NFHS 4. Additionally, NFHS 5 indicated a limited decline in wasting among children under age five, compared to NFHS 3. The prevalence of severely wasted children remained consistent across NFHS 3, 4, and 5. Additionally, weight-for-height Z scores demonstrated a decline in acute and severely underweight cases (below -3 SD) from 2005-06 to 2019-21.

Figure 2: Comparison of HAZ, WHZ, and WAZ for children under age five, NFHS3, NFHS4, and NFHS5, India

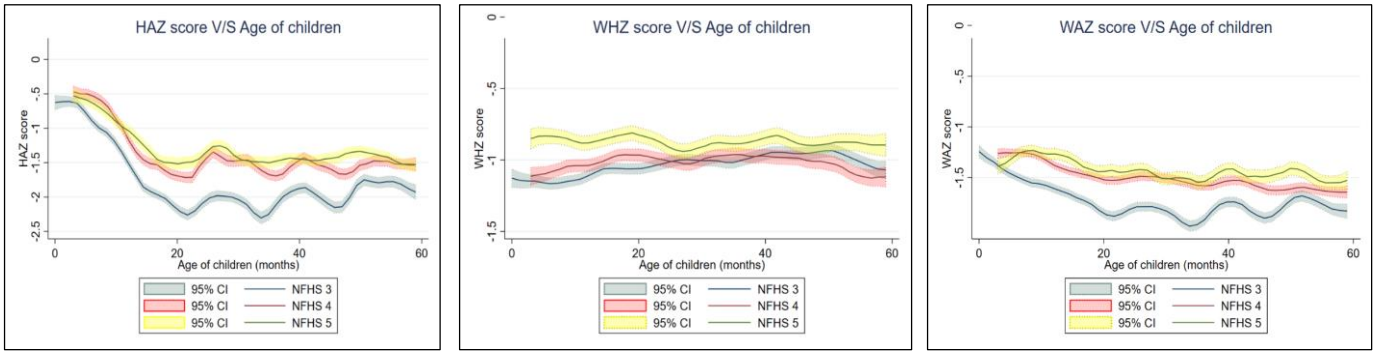


Figure 2 shows a substantial decline in Height-for-age Z-scores in early childhood, dropping from -0.5 SD to -2.3 SD between two to twenty months in NFHS 3. A similar trend was replicated in NFHS 4 and NFHS 5, though a lesser decline has been observed in NFHS 5 compared to NFHS 3. Meanwhile, WHZ plots illustrate a steady pattern for children aged 0 to five, with NFHS 3 showing lower WHZ scores and NFHS 5 exhibiting higher scores. WAZ scores experience significant shifts during early childhood (0 to 20 months), declining to nearly -2 SD in NFHS 3 for children under the age of twenty months, while the reduction in WAZ scores with increasing age is less in NFHS 4 and NFHS 5. This early age decline in HAZ, WHZ, and WAZ may be because of inadequate feeding practices or because young children are more prone to infection and disease. In this age group (first 24 months of the child), the mother's health also affects their child's health.

Table 1: Binary logistic regression of undernourished children of age under five by women empowerment, NFHS3, NFHS4, and NFHS5, India

Background Variables	NFHS 3		NFHS 4		NFHS 5	
	Coef	conf. Interval	Coef	conf. Interval	Coef	conf. Interval
Women's Empowerment Index						
Low ®						
Middle	0.0001	[-0.08,0.08]	-0.11*	[-0.20,-0.02]	-0.11*	[-0.20,-0.02]
High	-0.01	[-0.10,0.08]	-0.12**	[-0.21,-0.03]	-0.15***	[-0.24,-0.06]

* p<0.05, ** p<0.01, *** p<0.001; Note: The result is adjusted by all the background variables

Table 2: Variance and Intra-Class Correlation (ICC) from Multilevel Analysis for NFHS 3, NFHS 4, and NFHS 5, India

Undernutrition	**NFHS 3**		**NFHS 4**		**NFHS 5**	
Variance	Null Model	Complete Model	Null Model	Complete Model	Null Model	Complete Model
State	0.38[0.22,0.65]	0.09[0.04,020]	0.56[0.32,0.97]	0.1[0.04,0.24]	0.44[0.24,0.77]	0.08[0.03,0.20]
PSU	0.52[0.44,0.60]	0.12[0.06,0.34]	0.51[0.39,0.65]	0.35[0.29,0.46]	0.74[0.56,0.93]	0.42[0.11,1.56]
Household	1.46[1.26,1.70]	0.42[0.04,5.02]	4.24[3.92,4.59]	12.29[10.63,14.21]	4.66[4.25,5.10	11.03[9.21,13.21]
ICC						
State	0.070.05-0.13	0.02[0.01,0.04]	0.07[0.34,0.10]	0.01[0.002,0.016]	0.05[0.03,0.08]	0.01[0.002,0.014]
PSU	0.16[0.13,0.19	0.05[0.03,0.10]	0.12[0.09,0.16]	0.01[0.003,0.016]	0.13[0.10,0.16]	0.03[0.02,0.10]
Household	0.41[0.38,0.45]	0.16[0.03,0.53]	0.62[0.60,0.64]	0.79[0.77,0.81]	0.64[0.61,0.66]	0.78[0.75,0.80]

Table 1 reveals that during NFHS 3, the effect of women's empowerment had no significant effect on child undernutrition. The study's contrasting results may stem from population-specific factors, contextual variations, and methodological differences in measurement and analysis. However, by the time 2015-16, the basic needs and necessities had been fulfilled, and women's empowerment emerged as a key indicator of child nutrition in India. Furthermore, the study provides significant insights into the changing dynamics of child undernutrition in India from 2015-16 to 2019-21 Further, Table 2 shows that multilevel analysis suggests household-level vulnerability as the value of ICC remains the highest compared to the other levels in all the survey years, highlighting the need to address child undernutrition at the household level.

CONCLUSION: The findings of our study underscore the persistent challenges of child malnutrition in India. The observed decline in stunting prevalence is a positive sign, suggesting some progress in addressing chronic undernutrition. Multilevel analysis reinforces the importance of targeting interventions at the household level, where vulnerabilities are most pronounced. In conclusion, addressing undernutrition at the household level requires a multifaceted approach that addresses socio-economic disparities and women's empowerment to make healthier choices. Policy interventions focusing on household food security, maternal and child healthcare, education, and empowerment are essential for combating undernutrition effectively.

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