narra j

Original Article

Knowledge, attitudes, and practices related to the intergenerational cycle of malnutrition among adolescent girls: A school-based cross-sectional study

Tirumalasetti L. Varshitha[1], Sarada Vadlamani[2], Chaitanya Gujjarlapudi[3], Manasa R. Venkata[2] and Payala Vijayalakshmi[4*]

[1]Faculty of Medicine, GITAM Institute of Medical Sciences and Research, Visakhapatnam, India; [2]Department of Community Medicine, GITAM Institute of Medical Sciences and Research, Visakhapatnam, India; [3]Department of Community Medicine, Katuri Medical College, Guntur, India; [4]Department of Microbiology, GITAM Institute of Medical Sciences and Research, Visakhapatnam, India

*Corresponding author: vpayala@gitam.edu

Abstract

The intergenerational cycle of malnutrition contributes to adverse health outcomes across generations, with adolescence representing a key period for prevention. This study aimed to assess adolescent girls' knowledge, attitudes, and practices regarding the intergenerational cycle of malnutrition and to identify associated socio-demographic factors. A school-based cross-sectional study was conducted among adolescent girls in Visakhapatnam Urban, India, using a multistage probability sampling technique with probability proportional to size. Nine of 18 government secondary schools were randomly selected, followed by proportional selection of students from grades 8–10. Data were collected using a predesigned, pretested, semi-structured questionnaire. Multivariate logistic regression analysis was performed to examine factors associated with knowledge, attitude, and practice scores. A total of 316 adolescent girls were included; 50.3%, 62.7%, and 52.5% of participants had knowledge, attitude, and practice scores above the median, respectively. Multivariate analyses found that parental education and employment status were associated with knowledge and attitude scores. A total of 316 adolescent girls were included; 50.3%, 62.7%, and 52.5% had knowledge, attitude, and practice scores above the median, respectively. Maternal education was strongly associated with good knowledge (aOR 8.84; 95%CI: 4.65–16.78; $p<0.001$) and favorable attitudes (aOR 1.67; 95%CI: 1.11–2.52; $p=0.013$), while paternal education was also associated with knowledge (aOR 2.10; 95%CI: 1.16–3.83; $p=0.014$) and attitude (aOR 1.49; 95%CI: 1.00–2.21; $p=0.048$). Only family type was significantly associated with practices (aOR 0.62; 95%CI: 0.39–0.99; $p=0.047$). Although adolescent girls demonstrated basic nutritional awareness, their understanding of malnutrition as a life-course and intergenerational issue remained limited. Strengthening school-based nutrition education with an explicit life-course perspective may improve informed dietary choices and support public health strategies to interrupt the intergenerational cycle of malnutrition.

Keywords: Adolescent girls, intergenerational cycle, attitude, knowledge, malnutrition

Introduction

Adolescence, defined as the transitional period between childhood and adulthood (ages 10–19 years), accounts for a substantial proportion of India's population, with approximately 17.74% (253 million individuals) [1]. This life stage is characterized by rapid physical growth, cognitive maturation, and psychosocial development, during which lifelong health behaviors and dietary

https://narraj.org/

Received: November 15, 2025 - Accepted: January 23, 2026 - Published online: January 26, 2026

patterns are established. From a nutritional perspective, adolescence is a particularly vulnerable period because of increased physiological demands and frequent exposure to unhealthy dietary practices, which together heighten the risk of malnutrition [2].

The intergenerational cycle of malnutrition describes the transmission of poor nutritional status and adverse health outcomes across successive generations, with adolescent girls occupying a central position in this cycle [3,4]. Girls born with low birth weight to malnourished mothers are more likely to experience childhood stunting, progress to undernourished adolescence, and enter adulthood with compromised nutritional status, thereby increasing the likelihood of giving birth to low-birth-weight infants in the next generation [4,5]. Concurrently, increasing rates of overweight and obesity among adolescent girls are associated with adult obesity and a higher risk of non-communicable diseases, including diabetes and hypertension, which may also affect future generations [5]. In addition, the increased demand for micronutrients during adolescence, particularly iron, places girls at heightened risk of deficiency disorders, most notably anemia. If unaddressed, anemia during adolescence may lead to adverse maternal outcomes, low birth weight, and a higher risk of anemia in newborns, reinforcing the persistence of the triple burden of malnutrition across the life course [6]. Inadequate nutritional knowledge and unhealthy dietary practices during adolescence may exacerbate poor maternal health, impair fetal development, and contribute to adverse outcomes in subsequent generations [6,7].

Despite the implementation of multiple national health and nutrition programs in India—including the Adolescent Girls' Anemia Control Program, Weekly Iron and Folic Acid Supplementation (WIFS), Poshan Abhiyaan, and other adolescent-focused interventions—anemia and undernutrition remain prevalent among adolescent girls [8]. Existing evidence suggests that these programs have primarily emphasized supplementation and service delivery, while gaps persist in adolescents' understanding of nutrition, particularly regarding the life-course and intergenerational implications of malnutrition [5,9]. Several studies have emphasized the importance of improving adolescents' understanding of the intergenerational cycle of malnutrition as a foundation for sustainable behavior change [7-12]; however, empirical data on adolescents' knowledge and attitudes toward this concept remain limited. This study aimed to assess adolescent girls' knowledge and attitudes regarding the intergenerational cycle of malnutrition and to identify socio-demographic factors associated with these outcomes.

Methods

Study design and setting

A school-based cross-sectional study was conducted from October to November 2023 among adolescent girls enrolled in government secondary schools in Visakhapatnam Urban, Andhra Pradesh, India. The study population comprised students in grades 8 to 10, representing the adolescent age group. Government schools offering secondary education served as the study setting, providing a structured environment to assess adolescents' knowledge, attitudes, and dietary practices related to the intergenerational cycle of malnutrition.

Sample size and sampling method

Based on a prevalence rate of 57.3% from a previous study in Nigeria [13] with a 95% confidence, the sample size required for this study is 287. Adding a 10% non-response rate, the final sample size is 316. A multistage sampling technique was used. In the first stage, a list of all government schools (n=18) offering secondary education in Visakhapatnam Urban was obtained from the District Education Office. In the second stage, nine schools (50% of the listed schools) were randomly selected to better represent the sample. In the third stage, in each selected school, a list of adolescent girls studying from eighth to tenth grades was obtained. The students were then randomly selected from each school and grade using the proportional-to-size method.

Study instrument

A semi-structured questionnaire was developed and reviewed by experts from community medicine, dietetics, pediatrics, gynecology, and obstetrics to establish content validity and

reliability. The instrument was pretested among 30 students to ensure clarity, relevance, and alignment with the study objectives. The questionnaire comprised sections on sociodemographic characteristics, items assessing knowledge and attitudes related to the intergenerational cycle of malnutrition, and daily dietary practices. Knowledge items were scored by assigning 1 point per correct response, while attitudes were assessed using a 3-point Likert scale.

Internal consistency of the study instruments was evaluated using Cronbach's alpha. All scales demonstrated good reliability, with alpha values exceeding the acceptable threshold of 0.8. The knowledge and attitude domains showed Cronbach's alpha values of 0.822 and 0.865, respectively, while the practice domain demonstrated a Cronbach's alpha value of 0.832. These findings suggest that the questionnaire reliably measures the intended constructs and is appropriate for use in this study.

Study variables

Data on sociodemographic characteristics, including age, socioeconomic status assessed using the Modified Kuppuswamy Scale 2023 [14], and parental education and occupation, were collected. Participants' knowledge was assessed using a 10-item questionnaire, with each correct response earning 1 point, yielding a total score of 0–10. The knowledge domain evaluated awareness of basic nutrition concepts, including a balanced diet; nutrient requirements during adolescence, pregnancy, and lactation; definitions and signs of malnutrition (both undernutrition and overnutrition); and the effects of nutrition on growth, anemia, and reproductive health.

Attitudes were assessed using 10 items measured on a three-point Likert scale (agree=2; neutral=1; disagree=0), resulting in a total score range of 0–20. The attitude domain examined participants' beliefs regarding the importance of healthy eating behaviors across the life course, the influence of adolescent and maternal nutrition on child and adult health outcomes, and the perceived value of preventive nutrition practices during critical life stages, including adolescence, pregnancy, and lactation.

Daily dietary practices were assessed using five items. These items evaluated the frequency of consuming three or more meals per day, intake of three or more servings of fruits and vegetables, consumption of junk food, monitoring of height and weight, and encouragement of healthy eating behaviors among family members and peers. Responses were recorded on a three-point Likert scale (often=2; sometimes=1; never=0), with the junk food consumption item scored inversely to reflect poorer dietary behavior. The total practice score ranged from 0 to 10.

Data collection

Data collection was carried out in coordination with school authorities to minimize disruption to routine academic activities. Information was collected using a predesigned, pretested, semi-structured questionnaire administered to the participants in a classroom setting. The questionnaire was self-administered, with investigators available to clarify any questions. The questionnaire captured information on sociodemographic characteristics, nutritional knowledge, attitudes, and daily dietary practices. Before data collection, the study purpose was explained to all participants, and informed assent was obtained. Participants who declined to participate or were absent on the day of data collection were excluded.

Statistical analysis

Quantitative variables were summarized using frequencies and percentages or medians with interquartile ranges (IQRs), as appropriate. The Mann–Whitney U test and Kruskal–Wallis test were used to examine associations between sociodemographic characteristics and knowledge, attitude, and practice scores, followed by multivariate logistic regression analysis. Both crude odds ratios (ORs) and adjusted odds ratios (aORs) with 95% confidence intervals (CIs) were calculated to estimate the unadjusted and adjusted effects of the predictors. Statistical significance was defined as $p<0.05$. All statistical analyses were performed using SPSS version 25 (IBM, New York, USA).

Results

Participants' characteristics

A total of 316 adolescent girls were included in the final analysis, and their socio-demographic characteristics are presented in **Table 1**. Participants were aged between 13 and 16 years, with a mean age of 14.02 years. Most of them were Hindu and from lower socioeconomic backgrounds, with most residing in nuclear families. A high proportion of parents were literate, with 91.1% of mothers and 96.2% of fathers having received formal education. In terms of employment, 35.4% of mothers and 95.6% of fathers were engaged in income-generating occupations

Table 1. Characteristics of adolescent girls included in this study (n=316)

Variable	Frequency	Percentage
Student characteristics		
Age (years)		
10–14	224	70.9
15–19	92	29.1
Religion		
Hindu	256	81.0
Muslim	44	13.9
Christian	16	5.1
Socioeconomic status		
Upper middle	17	5.4
Lower middle	49	15.5
Upper lower	96	30.4
Lower	154	48.7
Class/grade		
8th	105	33.2
9th	132	41.8
10th	79	25.0
Type of family		
Nuclear	209	66.1
Joint	48	15.2
Three generation	59	18.7
Parents characteristics		
Mother's education		
Illiterate	28	8.9
Primary school	121	38.3
Middle school	62	19.6
High school	84	26.6
Intermediate/diploma	14	4.4
Graduate	7	2.2
Mother's occupation		
Unemployed	204	64.6
Employed	112	35.4
Father's education		
Illiterate	12	3.8
Primary school	36	11.4
Middle school	88	27.8
High school	116	36.7
Intermediate/ diploma	48	15.2
Graduate	16	5.1
Father's occupation		
Unemployed	14	3.8
Employed	302	95.6

Score of knowledge, attitude and practice

The knowledge scores ranged from 4 to 10, with a mean score of 6.66 (SD±1.11) and a median of 7.0 (IQR 6.5–7.5). Item-wise distribution of responses within the knowledge domain is presented in **Table 2**. The attitude scores of the respondents ranged from 7 to 20, with a mean of 15.48 (SD±3.20) and a median of 15.5 (IQR 13.0–18.0) (**Table 3**). The daily practices were assessed using five items on a 3-point Likert scale with a possible score range of 0 to 10 (**Table 4**). Most participants (87.7%) reported often consuming ≥3 meals per day. However, only 57.6% met the recommended intake of three or more daily servings of fruits and vegetables. Notably, 61.7%

reported frequent consumption of energy-dense, nutrient-poor foods. Practice scores ranged from 1 to 10, with a mean of 5.67 (SD±1.98) and a median of 6.0 (IQR 4.5–7.5) (**Table 4**).

Table 2. Knowledge scores regarding the intergenerational cycle of malnutrition among study participants (n=316)

Knowledge item	Correct response Frequency (%)	Incorrect response Frequency (%)
A balanced diet includes carbohydrates, fats, and proteins in the right proportions	313 (99.1)	3 (0.9)
Malnutrition refers to inappropriate nutritional intake	292 (92.4)	24 (7.6)
Malnutrition includes both undernutrition and obesity	50 (15.8)	266 (84.2)
Slow growth in adolescents is a sign of malnutrition	285 (90.2)	31 (9.8)
Undernourishment can be detected by less weight, height for age	284 (89.9)	32 (10.1)
Nutritional Intake will affect the fertility or menstrual cycle of the woman	50 (15.8)	266 (84.2)
Adolescents need more nutrients to support rapid growth and development	147 (46.5)	169 (53.5)
Adolescent girls need iron supplements to prevent anemia from menstruation and growth spurts	151 (47.8)	165 (52.2)
Pregnant women need extra nutrients and energy for fetal development	299 (94.6)	17 (5.4)
Lactating mothers require more nutrients to breastfeed effectively	232 (73.4)	84 (26.6)

Sources of nutrition-related information

Study participants reported receiving nutrition-related information from multiple sources, with schoolteachers being the most frequently cited (98%), followed by family members (64%), media outlets (61%), peers or friends (54%), and community health workers (42%).

Factors associated with knowledge, attitude and practice

Study participants were categorized into two groups for each domain using the median score as the cut-off point (**Figure 1**). In the multivariable logistic regression analysis, maternal education emerged as the strongest predictor for knowledge and attitude (**Table 5**). It was significantly associated with both knowledge (aOR: 8.84; 95%CI: 4.65–16.78; $p<0.001$) and attitude (aOR: 1.67; 95%CI: 1.11–2.52; $p=0.013$). Paternal education also showed a significant association with knowledge (aOR: 2.10; 95%CI: 1.16–3.83; $p=0.014$) and attitude (aOR: 1.49; 95%CI: 1.00–2.21; $p=0.048$) (**Table 5**). Notably, family type was significantly associated with practice (aOR 0.62; 95%CI: 0.39–0.99; $p=0.047$) (**Table 5**). Other variables, including age, class, religion, maternal occupation, and body mass index, were not significantly associated with outcome measures (**Table 5**).

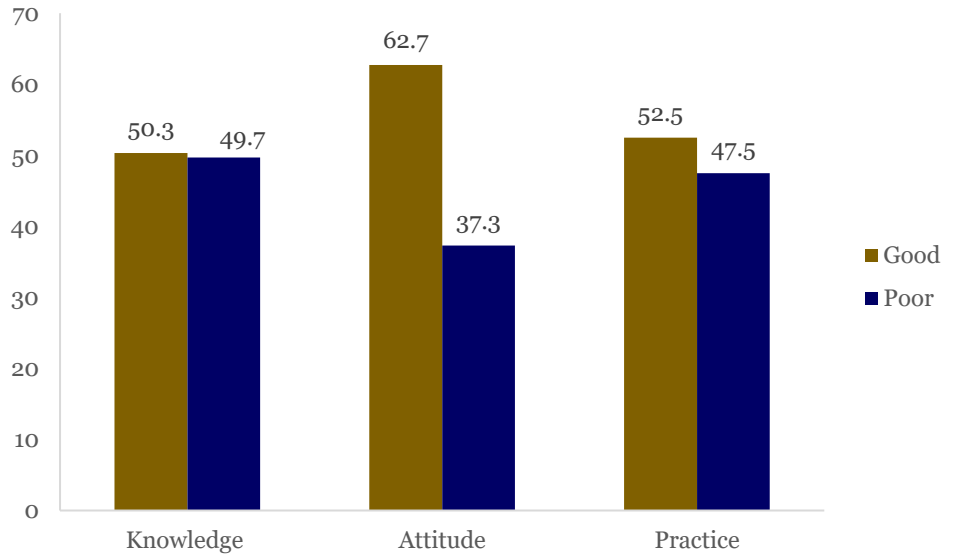

Figure 1. Percentage of participants with good knowledge, attitude and practice regarding intergenerational cycle of malnutrition among study participants.

Table 3. Attitude scores regarding the intergenerational cycle of malnutrition among study participants (n=316)

Attitude	Disagree	Neutral	Agree
	n (%)	n (%)	n (%)
Eating frequent meals with a variety of foods will prevent malnutrition	0 (0.0)	3 (0.9)	313 (99.1)
The dietary behaviors established during the adolescent period typically track into adulthood	4 (1.3%)	138 (43.7)	174 (55.1)
A malnourished mother is more likely to give birth to a low birth weight (LBW) baby	0 (0.0)	32 (10.1)	284 (89.9)
A baby girl born with LBW is more likely to grow into a small adult woman	26 (8.2)	178 (56.3)	112 (35.4)
The nutritional status of the lactating mother will affect the nutritional status of the breastfeeding baby	0 (0.0)	23 (7.3)	293 (92.7)
Feeding practices will affect the health status of infants and young children	0 (0.0)	108 (34.2)	208 (65.8)
Women post-lactation should maintain a healthy diet to support future pregnancies	33 (10.4)	201 (63.6)	82 (25.9)
Adolescence, pregnancy, and lactation are the important stages in life that require more nutrients	2 (0.6)	145 (45.9)	169 (53.5)
Nutritional status is passed along from generation to generation	58 (18.4)	194 (61.4)	64 (20.3)
Intervention to prevent malnutrition or nutritional deficiencies at any life stage is important	0 (0.0)	160 (50.6)	156 (49.4)

Table 4. Scores related to practices among the study participants (n=316)

Practices	Never	Sometimes	Often
	n (%)	n (%)	n (%)
How often do you take ≥3 meals per day?	0 (0.0)	39(12.3)	277 (87.7)
How often do you take ≥3 servings of fruits and vegetables in your diet per day?	14 (4.4)	120 (38.0)	182 (57.6)
How often do you eat junk food in a week?	18 (5.7)	103 (32.6)	195 (61.7)
How often do you monitor your height and weight?	169 (53.5)	129 (40.8)	18 (5.7)
Consumption of Iron folic acid supplements	42 (13.3)	138 (43.7)	136 (43)

Table 5. Multivariable logistic regression analysis of sociodemographic factors associated with knowledge, attitude, and practice regarding intergenerational cycle of malnutrition among study participants

Factors	Knowledge		Attitude		Practice	
	Adjusted odds ratio	*p*-value	Adjusted odds ratio	*p*-value	Adjusted odds ratio	*p*-value
Age	1.73 (0.81–3.72)	0.154	1.18 (0.65–2.11)	0.578	1.22 (0.67–2.23)	0.507
Class	0.99 (0.4–2.46)	0.991	0.97 (0.48–1.94)	0.935	0.7 (0.34–1.42)	0.326
Socioeconomic status	1.93 (0.9–4.12)	0.089	1.2 (0.71–2.03)	0.490	0.97 (0.59–1.61)	0.925
Educational of mother	8.84 (4.65–16.78)	<0.001**	1.67 (1.11–2.52)	0.013*	0.92 (0.59–1.33)	0.582
Educational of father	2.1 (1.16–3.83)	0.014*	1.49 (1–2.21)	0.048*	1.26 (0.85–1.88)	0.238
Religion	1.31 (0.7–2.47)	0.390	1.05 (0.66–1.67)	0.816	0.79 (0.51–1.24)	0.322
Mother occupation	0.93 (0.27–3.19)	0.918	1.46 (0.62–3.44)	0.381	1.36 (0.58–3.18)	0.475
Type of family	1.06 (0.52–2.17)	0.862	0.82 (0.5–1.32)	0.422	0.62 (0.39–0.99)	0.047*
Body mass index	0.98 (0.94–1.03)	0.601	0.98 (0.93–1.02)	0.390	1.05 (0.98–1.13)	0.095

* Statistically significant at $p<0.05$
** Statistically significant at $p<0.01$

Discussion

Most participants were in the early adolescent age group (10–14 years), practiced Hinduism, belonged to lower socio-economic backgrounds, and lived in nuclear families. Regarding knowledge, participants demonstrated a good awareness of balanced diets (99.1%), malnutrition (92.4%), its effects on growth (90.2%), and anthropometric assessment (89.9%). A large proportion were aware of increased nutritional requirements during pregnancy (94.6%) and lactation (73.4%). However, awareness of adolescent-specific nutritional needs was relatively low, with only 46.5% recognizing their own increased nutrient requirements and 47.8% understanding the importance of iron–folic acid (IFA) supplementation. Notably, only 15.8% were aware that malnutrition encompasses both undernutrition and overnutrition and may adversely affect fertility. These findings suggest that although participants had basic nutritional knowledge—particularly regarding pregnancy and lactation—they were less informed about nutritional needs during adolescence and about their role in the intergenerational cycle of malnutrition. This pattern may reflect the emphasis of school- and community-based nutrition education programs, which often prioritize maternal nutrition while underemphasizing adolescence, despite it being a critical period of rapid growth and development. Similar patterns have been reported in previous studies conducted in South Asia and Southeast Asia, where adolescents showed general nutrition awareness but limited understanding of adolescent-specific and intergenerational aspects [15-17].

In this study, approximately 50.3% of participants achieved good knowledge scores, comparable to proportions reported in previous studies [16]. Older adolescents tended to have higher knowledge scores, although the difference was not statistically significant. This trend is consistent with findings from other studies suggesting that increasing age is associated with greater dietary awareness and improved decision-making capacity [18]. Participants from higher socio-economic backgrounds and those with educated, employed parents scored higher on knowledge tests. Similar associations between socio-economic status, parental education, and adolescent health knowledge have been documented in studies from other low- and middle-income settings [19,20].

Most participants exhibited positive attitudes toward healthy eating practices. Nearly all agreed that consuming a varied diet prevents malnutrition (99.1%), that maternal malnutrition contributes to low birth weight (89.9%), and that the nutritional status of lactating mothers affects infant health (92.7%). However, attitudes were less favorable toward more complex and long-term concepts. Only 35.4% believed that girls born with low birth weight are more likely to become small adults, and just 20.3% recognized that malnutrition can be transmitted across generations. These findings suggest that while attitudes toward nutrition during pregnancy and lactation were generally positive, the understanding of intergenerational consequences—particularly those rooted in adolescence—remained limited. Similar observations have been reported in other vulnerable adolescent populations, where attitudes were more favorable toward familiar topics and less positive toward concepts that were poorly understood [21]. Overall, 62.7% of participants demonstrated good attitude scores, and socio-demographic factors, such as grade level, socioeconomic status, and parental education, were significantly associated with attitudes, consistent with findings from other school-based studies [22].

Regarding dietary practices, more than 87.7% of participants reported consuming at least three meals per day, although only 57.6% met the recommended intake of fruits and vegetables. Frequent consumption of junk food was reported by 61.7% of participants, and only 43% reported taking IFA supplementation, despite nearly half acknowledging its importance. Common barriers to adequate fruit and vegetable intake included limited availability and lack of interest. Overall, 52.5% of participants demonstrated good dietary practices. Socio-economic status and parental education were significantly associated with healthier practices. These findings are consistent with previous studies indicating that adolescents from higher socio-economic backgrounds and those with educated parents tend to exhibit healthier dietary behaviors and have better access to nutritional resources [23-26]. The high proportion of educated parents (>90%) in this study highlights an opportunity to strengthen adolescent nutrition outcomes through targeted, family-centered educational interventions.

Variability across domains showed relatively low knowledge scores, moderate practice, and high attitudes, suggesting that while basic knowledge was relatively uniform, there remains

considerable scope to improve attitudes and translate knowledge into consistent, healthy practices.

Schoolteachers were identified as the primary source of nutrition-related information, followed by family members, peers, media, and community health workers, a pattern also reported in previous school-based studies [13]. This finding underscores the potential value of integrating structured, age-appropriate nutrition education—particularly on adolescence and intergenerational malnutrition—into the school curriculum and delivering it through trained teachers.

The strengths of this study include its novelty as one of the first investigations on the intergenerational cycle of malnutrition among adolescent girls in Andhra Pradesh, South India, and the use of probability sampling, which enhances the generalizability of the findings. However, a key limitation was the limited availability of published literature on the intergenerational cycle of malnutrition, as it remains an emerging concept. This constrained comprehensive contextualization of the findings within the existing body of evidence.

Conclusion

The study revealed that although adolescent girls had basic nutritional knowledge, they lacked a deeper understanding of how malnutrition affects different life stages and its intergenerational consequences. It emphasized the importance of incorporating comprehensive nutrition and health education into schools and communities, with schools and families identified as key sources of information. Equipping adolescents with the knowledge to make informed health choices can help break the cycle of malnutrition and enhance future health outcomes. Additionally, the study highlighted the impact of parental socio-economic status and education on children's nutrition awareness, stressing the need for interventions that address these factors. Further research adopting a mixed-methods approach helps identify knowledge gaps and key factors—socio-cultural, economic, and environmental—that impact adolescents' understanding of nutrition, leading to more targeted, effective interventions against malnutrition.

Ethics approval

Approval was obtained from the Institutional Ethics Committee of GITAM Institute of Medical Sciences and Research (GIMSR/Admn/Ethics/approval/IEC-228/2023, dated 27-9-2023).

Acknowledgments

We thank the adolescent girls and school authorities for their participation and support.

Competing interests

All the authors declare that there are no conflicts of interest.

Funding

This project is an ICMR-STS-funded project (Ref id:2023–04292).

Underlying data

Derived data supporting the findings of this study are available from the corresponding author on request.

Declaration of artificial intelligence use

We hereby confirm that no artificial intelligence (AI) tools or methodologies were utilized at any stage of this study, including during data collection, analysis, visualization, or manuscript preparation. All work presented in this study was conducted manually by the authors without the assistance of AI based tools or systems.

How to cite

Varshitha TL, Vadlamani S, Gujjarlapudi C, *et al*. Knowledge, attitudes, and practices related to the intergenerational cycle of malnutrition among adolescent girls: A school-based cross-sectional study. Narra J 2026; 6 (1): e2993 - http://doi.org/10.52225/narra.v6i1.2993.

References

1. Registrar General of India. Census of India. Table C-13, single year age returns by residence and sex. New Delhi: Registrar General of India; 2011. Available from: https://censusindia.gov.in/nada/index.php/catalog/1436. Accessed: 24 October 2023.
2. Azeredo CM, Levy RB, Peres MF, *et al*. Patterns of health-related behaviours among adolescents: A cross-sectional study based on the National Survey of School Health Brazil 2012. BMJ Open 2016;6(11):e011571.
3. Siswati T, Olfah Y, Kasjono HS, Paramashanti BA. Improving adolescent knowledge and attitude toward the intergenerational cycle of under-nutrition through audiovisual education: Findings from RESEPIN study in Yogyakarta, Indonesia. Indian J Community Med 2022;47:196-201.
4. Arlinghaus KR, Truong C, Johnston CA, Hernandez DC. An intergenerational approach to break the cycle of malnutrition. Curr Nutr Rep 2018;7(4):259-267
5. Nurul-Farehah S, Rohana AJ. Maternal obesity and its determinants: A neglected issue? Malays Fam Physician 2020;15(2):34-42.
6. Shah AR, Subramanyam MA. Community-level women's education and undernutrition among Indian adolescents: A multilevel analysis of a national survey 2021; PLoS One 2021;16(5):e0251427.
7. Prithishkumar IJ, Sappani M, Ranjan V, *et al*. Double burden of malnutrition among women of reproductive age: Trends and determinants over the last 15 years in India. PLoS One 2024;19(6):e0304776.
8. Government of India, PIB. Breaking inter-generational cycle of malnutrition and optimising nutrition outcomes. 2017. Available from: https://www.pib.gov.in/newsite/PrintRelease.aspx?relid=170335&reg=3&lang=2. Accessed: 19 December 2025.
9. Goldstein RF, Abell SK, Ranasinha S, *et al*. Association of gestational weight gain with maternal and infant outcomes: A systematic review and meta-analysis. JAMA 2017;317(21):2207-2225.
10. Bhowmik B, Siddique T, Majumder A, *et al*. Maternal BMI and nutritional status in early pregnancy and its impact on neonatal outcomes at birth in Bangladesh. BMC Pregnancy Childbirth 2019;19:413.
11. Win KM, Putten MV, Vajanapoom N, Amnatsatsue K. Early pregnancy and maternal malnutrition as precursors of stunting in children under two years of age among Bhutanese refugees, in Nepal. Maternal precursors of stunting of children. Sci Technol Asia 2013;18:35-42.
12. Brown R, Seabrook JA, Stranges S, *et al*. Examining the correlates of adolescent food and nutrition knowledge. Nutrients 2021;13(6):2044.
13. Charles SR, Ismail S, Ahmad N, *et al*. Knowledge, attitude, and practice of adolescent girls towards reducing malnutrition in Maiduguri Metropolitan Council, Borno State, Nigeria: Cross-sectional study. Nutrients 2020;12(6):1681.
14. Radhakrishnan M, Nagaraja SB. Modified Kuppuswamy socioeconomic scale 2023: Stratification and updates. Int J Community Med Public Health 2023;10:4415-4418
15. Deekala RS, Kokku MR. Assessment of nutritional status in adolescent girls residing in social welfare hostels in Tirupati town: A cross sectional study. Int J Community Med Public Health 2018;5(12):5110-5114.
16. Farjana RB, Joti LB, Kazi AK. Knowledge, attitude and practices regarding nutrition among adolescent girls in Dhaka City: A cross-sectional study. Nutri Food Sci Int J 2021;10(4):555795007.007.
17. Sitti P, Ida R, Ansar M, Abdul RT. Knowledge, attitude and practices of balanced diet and correlation with hypochromic microcytic anemia among adolescent school girls in maros district, South Sulawesi, Indonesia. Biomed Res 2016;27(1):165-171.
18. Divya C, Geetha K, Geetha M, *et al*. Nutritional knowledge, attitude and practices of adolescent girls: A comparative study between rural and urban. Mysore J Agric Sci 2022;56(3):93-100.
19. Giri D, Vajanapoom N, Langkulsen U. Factors influencing undernutrition among female adolescent students in Darchula District, Nepal. Nutrients 2023;15(7):1699.
20. Paul D, Chhanda C, Mishra P. Factors affecting malnutrition of rural adolescent girls: Evidences from selected districts of West Bengal. Child Youth Serv Rev 2023;152:107065–5.
21. Islam MdA, Sultana M, Islam MdT. Evaluation of knowledge, attitude and practice about hygiene and nutrition among adolescent girls in Rohingya refugee camps in Bangladesh. Sci J Food Sc Nutr 2023;8(1):001-005.

22. Sireesha G, Rajani N. Teenage girls' knowledge attitude and practices on nutrition. Int J Home Sci 2017;3(2):491-494.
23. Asim DS, Kamran DJ, Gilani DR, *et al*. Assessment of dietary habits of adolescent in army public schools in Chaklala Garrison. PAFMJ 2019;69(SUPPL 2):S273-79.
24. Savage JS, Fisher JO, Birch LL. Parental influence on eating behavior: conception to adolescence. J Law Med Ethics 2007;35(1):22-34.
25. Sarkar P, Rifat MA, Bakshi P, *et al*. How is parental education associated with infant and young child feeding in Bangladesh? A systematic literature review. BMC Public Health 2023;23(1):510.
26. Pandurangi R, Mummadi MK, Challa S, *et al*. Burden and predictors of malnutrition among Indian adolescents (10-19 years): Insights from comprehensive national nutrition survey data. Front Public Health 2022;10:877073.