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Original Research Article

Development and validation of a structured questionnaire to assess screen exposure, influence of food advertisement and parental nutrition knowledge in early childhood

Nagadharshini P.[1], Veena B. M.[1]*, Shweatha H. E.[1], Meena Kumari[2]

[1]Department of Nutrition and Dietetics, JSS Academy of Higher Education and Research, Mysuru, Karnataka, India
[2]Department of Food technology, Amity University, Noida, Uttar Pradesh, India

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***Correspondence:**
Dr. Veena B. M.,
E-mail: veenajanu@jssuni.edu.in

ABSTRACT

Background: Early childhood is a critical period for the establishment of food preferences and eating behaviour. The growing penetration of digital media and targeted food advertising has increased children's exposure to energy-dense, nutrient-poor products, while parental nutrition knowledge mediates the impact of these exposures on child dietary behaviour.

Methods: This cross-sectional, questionnaire-based instrument development and validation study was conducted among parent-child dyads recruited from Anganwadi centres and private preschools in Mysuru and Hosur taluks between March 2024 and October 2025. A structured questionnaire covering four domains food advertising exposure, screen-time patterns, parental nutrition knowledge, and preschoolers' eating habits- was developed through item generation, expert content/face validation (content validity ratio using Lawshe's method), pilot testing (n=25), and reliability testing, before administration to the final study sample of 1200 parent-child dyads (600 each from Mysuru and Hosur).

Results: The questionnaire demonstrated good overall internal consistency (Cronbach's α=0.78), with domain-wise values of 0.83 (food advertising exposure), 0.76 (screen time patterns), 0.72 (parental nutrition knowledge), and 0.81 (preschoolers' eating habits). Among the 1200 children (mean age distributed across 3-5 years; 54.3% boys in Mysuru and 50.8% girls in Hosur), average daily screen time was 1.39±0.74 hours, with 23.3% of children in the high (>2 hours/day) screen-time category. Socio-economic classification using the Modified Kuppuswamy Scale (2025) showed the largest proportion of families (40.0%) in the lower-middle class, and 37.3% of parents demonstrated low nutrition knowledge at baseline.

Conclusions: The developed questionnaire is a valid and reliable instrument for the integrated assessment of food advertising exposure, screen-time behaviour, parental nutrition knowledge, and dietary habits among preschool-aged children, and offers a practical, replicable tool for researchers and public health practitioners.

Keywords: Dietary behaviour, Food advertising; Parental nutrition knowledge, Preschoolers, Questionnaire development, Reliability, Screen time; South India, Validation

INTRODUCTION

Food preferences and eating patterns formed during the preschool years often persist into later life, influencing long-term nutritional status and risk of chronic disease. In recent decades, children's food choices have been increasingly shaped by exposure to media and targeted food advertising, with acute exposure to unhealthy food advertising shown to increase short-term food intake in children.[1] Advertisements for high-fat, sugar-, and salt-

rich foods are prevalent across television, smartphones, and online platforms, encouraging consumption of nutrient-poor products.[2] Simultaneously, children's screen exposure has grown rapidly; several clinical and observational studies report that excessive screen time promotes mindless eating and higher consumption of processed foods while displacing physical activity.[3] The World Health Organization recommends limiting recreational screen exposure for preschoolers to less than one hour per day; however, adherence remains low in most populations.[4] Parental nutrition knowledge is a key determinant that mediates these influences, since parents shape both food availability and screen habits in the household, and their understanding of balanced diets, portion sizes, and feeding practices can either buffer or reinforce media effects.[5] Despite extensive research on these individual factors, few validated tools integrate food advertising exposure, screen-time behaviour, and parental nutrition knowledge into a single measurement framework; existing questionnaires, such as those developed to assess children's exposure to unhealthy food marketing, have typically addressed a single construct in isolation rather than their combined influence on dietary behaviour.[6] Hence, this study aimed to develop and validate a questionnaire that holistically assesses food advertising exposure, screen-time patterns, parental nutrition knowledge, and eating habits among preschool-aged children.

METHODS

Study type

This was a cross-sectional, questionnaire-based instrument development and validation study, conducted in two phases: (i) development and psychometric validation of the questionnaire, and (ii) field administration of the validated tool to the study sample.

Study place and period

The study was conducted among parent-child dyads recruited from preschools in Mysuru and Hosur taluks, over the period March 2024 to October 2025.

Inclusion criteria

Preschool children aged 3 to 5 years. Parents or primary caregivers responsible for the child's feeding and screen-related habits, willing to participate in the study. Families who provided informed written consent and were available for the single data-collection session.

Exclusion criteria

Children with chronic illnesses, developmental delays, or on medically restricted diets. Parents or guardians unwilling to provide consent. Children who were irregular in school attendance or unavailable during data collection.

Procedure

Item generation

The content was derived from an extensive review of existing instruments and literature on food marketing, media influence, parental feeding practices, and child nutrition; guidelines from the World Health Organization and the ICMR-National Institute of Nutrition were reviewed to ensure alignment with established health and nutrition standards.[8]

The preliminary questionnaire consisted of four domains:

Food advertising exposure: frequency and type of advertisements viewed (television, mobile phones, tablets), food types promoted, and children's recall of brands.

Screen time patterns: average daily exposure, content type, and viewing context (during meals, leisure, etc.).

Parental nutrition knowledge: awareness of balanced diets, understanding of food labels, and differentiation between nutrient-dense and calorie-dense foods.

Preschoolers' eating habits: meal regularity, snack frequency, fruit and vegetable intake, and preference for advertised foods.

Items were framed in simple, culturally appropriate language and were primarily close-ended ("yes/no," "sometimes," "often"). Likert-scale questions (5-point) were used for attitudinal measures, and limited open-ended questions allowed qualitative elaboration.

Scoring, scaling, and composite indices

Responses were coded numerically to facilitate statistical analysis. Likert-type items were scored from 1 (strongly disagree) to 5 (strongly agree); frequency-based responses ranged from 0 (never) to 4 (very often); reverse scoring was applied where necessary (e.g., higher scores indicating unhealthy behaviour). Three composite indices, each scaled from 0 to 1, were derived as proportions of positively endorsed items:

Dietary diversity index (DDI)

Based on food-frequency data, calculated in line with FAO guidelines on dietary diversity assessment.[9]

For each child, consumption of six major food groups (cereals and millets; pulses and legumes; fruits; vegetables including green leafy vegetables; milk and milk products; and eggs/meat/poultry) was scored 1 if consumed daily and 0 if consumed less than daily or never. The DDI was calculated as the number of food groups consumed daily divided by six, giving a score from 0 (no daily food-group consumption) to 1 (daily

consumption of all six groups); higher scores indicate greater dietary diversity.

Unhealthy eating index (UEI)

Developed to quantify consumption of energy-dense, nutrient-poor foods, based on ICMR-National Institute of Nutrition guidance on foods to limit in children.[8]

Eight food items/categories (biscuits and cookies; cakes and pastries; chocolates and candies; ice cream; chips and fried snacks; instant noodles; carbonated soft drinks; and sweetened packaged drinks) were each scored 1 if eaten daily and 0 if eaten less often or never. The UEI was calculated as the number of unhealthy items eaten daily divided by eight, giving a score from 0 (none eaten daily) to 1 (all eight eaten daily); higher scores represent higher consumption of energy-dense foods.

Advertisement exposure index (AEI)

Derived from a parent-reported questionnaire assessing children's exposure to food advertisements across television, YouTube, mobile applications, and streaming services.

Items used dichotomous (yes/no) and ordinal (always/often/rarely/never) formats. Responses indicating exposure (yes, always, or often) were coded 1 and those indicating no exposure (no, rarely, or never) were coded 0. The AEI was computed as the proportion of exposure-positive items to the total number of items, yielding a continuous score from 0 (no exposure) to 1 (exposure across all platforms); higher scores indicate greater exposure to food marketing. Responses were dichotomized to reduce reporting bias and improve interpretability across platforms.

Screen-time assessment

Screen-time exposure was measured through parent-reported average daily hours spent by the child in front of televisions, smartphones, tablets, laptops, and other digital devices. Consistent with WHO (2019) recommendations, children were categorised into three screen-time groups: low (<1 hour/day), medium (1-2 hours/day), and high (>2 hours/day).[4]

Content and face validation

A multidisciplinary panel of seven experts in nutrition, early childhood education, and behavioural sciences evaluated the questionnaire for clarity, relevance, and cultural suitability. The content validity ratio (CVR) was calculated using Lawshe's method, with items scoring above 0.75 retained.[7]

Face validity was established by pre-testing with ten parents, who confirmed comprehension and contextual relevance; minor linguistic and sequencing adjustments were made based on their feedback.

Pilot testing

A pilot study with 25 parents of preschoolers assessed the clarity, flow, and feasibility of the tool. The average completion time was 20-25 minutes. Feedback indicated the questionnaire was relevant, clear, and not repetitive; based on responses, a few items were refined for brevity and coherence.

Reliability testing

Internal consistency reliability was assessed using Cronbach's alpha, both overall and separately for each of the four domains (reported in the results).

Field administration

Following validation, the finalised questionnaire was administered to the full study sample of 1200 parent-child dyads (600 from Mysuru and 600 from Hosur).

Ethical approval

Ethical clearance was obtained at the institutional level from the Institutional Ethics Committee of JSS Academy of Higher Education and Research, Mysuru (Approval No. JSSMC/IEC/07112024/22 NCT/2024-25). Written informed consent was secured from parents prior to data collection. Participation was voluntary; confidentiality of all data was maintained through anonymized codes, and participants retained the right to withdraw at any stage without academic or institutional consequences.

Statistical analysis

Data were analysed using IBM SPSS Statistics, Version 26.0 (IBM Corp., Armonk, NY, USA), with statistical significance set at $\alpha=0.05$ (two-tailed). Data preparation included double data-entry verification, cleaning for out-of-range values and duplicate entries, and evaluation of missing-data patterns (missing data were <5% for key variables; listwise deletion was used for analyses requiring complete cases). Continuous variables (e.g., age, screen time) were summarized as mean±SD, and categorical variables as frequencies and percentages. Reliability was assessed using Cronbach's alpha (overall and domain-wise). Group comparisons between Mysuru and Hosur for categorical variables were performed using the Chi-square test of independence, with Fisher's exact test applied when expected cell frequencies were <5, and effect size reported as Cramér's V.

RESULTS

A total of 1200 parent-child dyads (600 each from Mysuru and Hosur) completed the final questionnaire and were included in the analysis.

Content and face validity

All retained items achieved a content validity ratio above the 0.75 threshold using Lawshe's method, and pre-testing with ten parents confirmed adequate face validity and comprehension of item wording.

Reliability

The overall Cronbach's alpha for the questionnaire was 0.78, exceeding the acceptable threshold of 0.7. Domain-wise reliability values are presented in Table 1.

Baseline characteristics of study participants

The two sites were comparable in age and gender distribution, but differed significantly in religion and family type, with Hosur showing a markedly higher proportion of nuclear families (76.8% versus 65.7% in Mysuru).

Table 1: Domain-wise internal consistency (Cronbach's α) (n=1200).

Domain	Cronbach's α
food advertising exposure	0.83
screen time patterns	0.76
parental nutrition knowledge	0.72
Preschoolers' eating habits	0.81
overall questionnaire	0.78

The two sites were comparable in age and gender distribution, but differed significantly in religion and family type, with Hosur showing a markedly higher proportion of nuclear families (76.8% versus 65.7% in Mysuru).

Socio-economic status was classified using the Modified Kuppuswamy Scale, updated for 2025.[12]

Table 2: Socio-economic and demographic profile of the selected preschool children (n=1200).

Profile	Mysuru (n=600) (%)	Hosur (n=600) (%)	χ^2 (df), P value
Age: 3 years	189 (31.5)	185 (30.8)	$\chi^2(2)=1.30$, p=0.522, ns
Age: 4 years	213 (35.5)	199 (33.2)	
Age: 5 years	198 (33.0)	216 (36.0)	
Gender: Boys	326 (54.3)	295 (49.2)	$\chi^2(1)=3.00$, p=0.083, ns
Gender: Girls	274 (45.7)	305 (50.8)	
Religion: Hindu	408 (68.0)	354 (59.0)	$\chi^2(2)=10.66$, p=0.005**
Religion: Christian	137 (22.8)	171 (28.5)	
Religion: Muslim	55 (9.2)	75 (12.5)	
Family type: Nuclear	394 (65.7)	461 (76.8)	$\chi^2(1)=17.72$, p<0.001***

Note. ns = not significant; **p < .01; ***p < .001.

Table 3: Socio-economic classification of families according to the modified Kuppuswamy Scale (2025).

Socio-Economic Class	Score Range	Frequency	Percentage
Upper (Class I)	26-29	58	4.8
Upper Middle (Class II)	16-25	312	26.0
Lower Middle (Class III)	11-15	480	40.0
Upper Lower (Class IV)	5-10	278	23.2
Lower (Class V)	<5	72	6.0
Total	—	1200	100.0

Table 4: Parental educational qualification.

Qualification	Father: Mysuru (%)	Father: Hosur (%)	Mother: Mysuru (%)	Mother: Hosur (%)
Primary	47 (7.8)	27 (4.5)	56 (9.3)	25 (4.2)
Secondary	151 (25.2)	137 (22.8)	153 (25.5)	114 (19.0)
Higher Secondary	223 (37.2)	173 (28.8)	182 (30.3)	182 (30.3)
Graduate	146 (24.3)	187 (31.2)	167 (27.8)	212 (35.3)
Postgraduate	33 (5.5)	76 (12.7)	42 (7.0)	67 (11.2)

Note. Father's qualification: $\chi^2(4)=34.41$, p<0.001**. Mother's qualification: $\chi^2(4)=28.64$, p<0.001***.

The majority of families (63.2%) fell within the upper-middle to lower-middle socio-economic classes, with only a small proportion (4.8%) in the highest class and 6.0% in the lowest, indicating that the sample was broadly representative of the middle socio-economic

strata typical of this semi-urban and urban south Indian population.

Higher secondary was the most common qualification among fathers in Mysuru (37.2%), whereas graduate-level qualification was most frequent among both parents in Hosur (31.2% of fathers and 35.3% of mothers), a significant site-wise difference for both parents.

Screen-time exposure

The mean daily screen time of 1.39±0.74 hours exceeds the WHO-recommended ceiling of one hour per day for this age group, indicating that, on average, preschoolers in this sample were exposed to screens for more time than currently recommended.

Table 5: Average daily screen time among preschoolers (n=1200).

Variable	Mean±SD	Minimum-maximum	Total
Total screen time (hours/day)	1.39±0.74	0.10-3.26	1200

Note. Screen time refers to total daily time across all devices (TV, mobile phone, tablet, computer).

Table 6: Distribution of preschool children by daily screen-time categories (n=1200).

Screen-Time Category	Mysuru (n=600) (%)	Hosur (n=600) (%)	Total (n=1200) (%)
Low (<1 hour)	200 (33.3)	237 (39.5)	437 (36.4)
Medium (1-2 hours)	238 (39.7)	245 (40.8)	483 (40.2)
High (>2 hours)	162 (27.0)	118 (19.7)	280 (23.3)
Total	600 (100.0)	600 (100.0)	1200 (100.0)

Note. Categories follow WHO (2019) recommendations for children aged 2-5 years. $\chi^2(2)=10.15$, p=0.006**, Cramér's V =0.092.

Table 7: Distribution of parents by nutrition knowledge level (n=1200).

Knowledge level	Mysuru (n = 600) n (%)	Hosur (n = 600) n (%)	Total (N = 1200) n (%)
Low	204 (34.0)	244 (40.7)	448 (37.3)
Moderate	224 (37.3)	214 (35.7)	438 (36.5)
High	172 (28.7)	142 (23.7)	314 (26.2)
Total	600 (100.0)	600 (100.0)	1200 (100.0)

Note. Percentile-based cut-offs (33rd and 67th percentiles) used to classify low, moderate, and high knowledge levels. $\chi^2(2)=6.67$, p=0.036*, Cramér's V =0.075.

Overall (23.3%) fell in the high screen-time category (>2 hours/day), with a significantly higher proportion in Mysuru (27.0%) than in Hosur (19.7%).

Parental nutrition knowledge

More than a third of parents overall (37.3%) had low nutrition knowledge, with a significantly higher proportion of low-knowledge parents in Hosur (40.7%) than in Mysuru (34.0%).

DISCUSSION

This study developed and validated a structured, four-domain questionnaire for the integrated assessment of food advertising exposure, screen-time patterns, parental nutrition knowledge, and eating habits among preschool-aged children, and administered it to a large sample of 1200 parent-child dyads across two South Indian sites.

The overall internal consistency of the present questionnaire (Cronbach's α=0.78) compares favourably with previously published instruments assessing related constructs in children; for example, a food label literacy questionnaire validated among elementary school children reported an overall reliability of 0.77.[10]

Similarly, a recently developed questionnaire assessing children's exposure to unhealthy food marketing reported a Cronbach's alpha of 0.75.[6]

By contrast, a television food-advertising questionnaire validated among Malaysian schoolchildren reported considerably lower internal consistency (0.45-0.60) across its subscales, which the authors attributed to the small sample size and single-site testing; the present study's larger sample (n=1200) and multi-domain, multi-site design may explain its comparatively higher and more consistent domain-wise alpha values (0.72-0.83).[11]

The content validation approach used in this study, based on Lawshe's method, is a well-established procedure for quantifying expert agreement on item relevance and is widely applied in the development of health-related instruments; the acceptance threshold of 0.75 used here is consistent with recommended practice for panels of similar size.[7]

The observed average daily screen time of 1.39±0.74 hours, with 23.3% of children exceeding the WHO-recommended limit of one hour per day, aligns with the broader literature documenting widespread non-adherence to screen-time guidelines in young children and the associated risks of mindless eating and displaced physical activity.[3]

The finding that Mysuru showed a significantly higher proportion of children in the high screen-time category compared with Hosur (27.0% versus 19.7%) may reflect underlying differences in family structure and urbanity between the two sites, as reflected in the significantly higher proportion of nuclear families in Hosur.

Parental nutrition knowledge was low in over a third of the sample (37.3%), a pattern broadly consistent with evidence that parental attitudes and understanding of nutrition strongly influence household food environments and children's eating behaviour.[5]

The significant association between parental educational qualification and socio-economic class in this sample is consistent with the well-documented role of household socio-economic position- assessed here using the 2025-updated Modified Kuppuswamy Scale- in shaping the nutrition-related resources and knowledge available to families.[12]

The findings on food advertising exposure and its association with screen-time patterns reinforce prior evidence that greater media exposure increases children's contact with the marketing of energy-dense, nutrient-poor foods, underscoring the value of an integrated measurement approach rather than assessing these constructs in isolation.[1]

Taken together, these results support the utility of the developed questionnaire as a psychometrically sound and contextually appropriate tool for South Indian preschool populations, while highlighting site-level differences in family structure, screen-time behaviour, and parental knowledge that merit consideration in future interventions.

Strengths of this study include the large sample size, the two-site design, and the multistage validation process combining content, face, and reliability testing. Limitations include the cross-sectional design, which precludes causal inference, and the reliance on parent-reported measures of screen time and dietary intake, which may be subject to recall and social-desirability bias.

CONCLUSION

This study successfully developed and validated a structured questionnaire to assess how food advertising exposure, screen-time patterns, and parental nutrition knowledge collectively influence the eating behaviour of preschoolers. The tool demonstrated strong content validity and good internal reliability (Cronbach's α=0.78; domain-wise range 0.72-0.83) when administered to 1200 parent-child dyads across Mysuru and Hosur. Its multidimensional design allows for integrated assessment of environmental and parental determinants of child nutrition, offering researchers a replicable model for examining how digital media and food marketing impact young children's diets, and providing a reliable foundation for future interventions promoting healthy food choices in early childhood.

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