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Original Research Article

Awareness and knowledge of growth charts among mothers of children under 24-months attending a tertiary care paediatric outpatient department in Puducherry: a cross-sectional study

Anithadevi Kumaravel*, Kannan Krishnamoorthy, Rajini Senthil

Department of Community Medicine, Bharath University, Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry, India

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***Correspondence:**
Dr. Anithadevi Kumaravel,
E-mail: anithadevi023@gmail.com

ABSTRACT

Background: Growth charts are essential tools for monitoring child growth and early detection of malnutrition. Maternal awareness and knowledge regarding growth charts play a crucial role in ensuring appropriate child health practices.
Methods: A cross-sectional study was conducted among 110 mothers of children under 24 months attending the Paediatric outpatient department (OPD) of a tertiary care teaching hospital in Puducherry (Sri Lakshmi Narayana Institute of Medical Sciences and Hospital) from April 1, 2025, to June 30, 2025. Data were collected using a structured questionnaire. The Chi-square test and multivariable logistic regression were used to assess associations. A $p<0.05$ was considered statistically significant.
Results: Among the participants, 46 (41.8%) mothers were aware of growth charts, while 78 (70.9%) had adequate knowledge of them. Maternal education was significantly associated with both awareness and knowledge ($p<0.001$). Socio-economic status was also significantly associated with awareness ($p=0.028$). Other variables such as age, occupation, number of children, child age, and sex were not significantly associated.
Conclusions: The study highlights a gap between awareness and knowledge of growth charts among mothers. Maternal education emerged as the key determinant influencing both awareness and knowledge. Strengthening awareness through targeted health education is essential to improving growth monitoring practices.

Keywords: Growth charts, Awareness, Knowledge, Mothers, Socio-economic status

INTRODUCTION

Child growth monitoring is a fundamental component of pediatric healthcare and plays a critical role in the early detection of growth faltering, undernutrition, and developmental problems among young children. Growth charts are widely used as simple, low-cost tools that enable healthcare providers and caregivers to assess a child's nutritional and health status over time. The World Health Organization recommends routine growth monitoring using standardized growth charts to evaluate indicators such as weight-for-age, height-for-age, and weight-for-height, particularly during the first two years of life, a crucial period for physical, cognitive, and immunological development.[1]

Despite global improvements in child health, undernutrition remains a major public health concern in many low- and middle-income countries. Millions of children continue to experience growth faltering due to inadequate nutrition, infections, and limited access to healthcare. Growth monitoring therefore, serves as an essential strategy for early identification of nutritional problems and timely intervention.[1]

India bears a substantial burden of childhood malnutrition. Data from the National Family Health Survey (NFHS-5) indicate that 35.5% of children under five years are stunted, 32.1% are underweight, and 19.3% are wasted, highlighting persistent challenges in achieving optimal child growth and development.[2] To address these issues, the Government of India has incorporated growth monitoring into several maternal and child health programmes, including the Integrated Child Development Services (ICDS) scheme and the Rashtriya Bal Swasthya Karyakram (RBSK). These programmes promote regular growth assessment using growth charts at Anganwadi centres, immunization clinics, and pediatric healthcare facilities.[2]

However, the effectiveness of growth monitoring programmes depends not only on the availability of services but also on the awareness and understanding of caregivers, particularly mothers, who are the primary decision-makers in child health and nutrition practices.[3,4] Mothers who can interpret growth charts can recognize early signs of growth faltering and seek timely medical care or nutritional support for their children.

Previous studies conducted in various parts of India have identified gaps in maternal awareness and knowledge regarding growth monitoring tools. For instance, Kumar et al. reported that less than half of mothers were able to correctly interpret growth curves, indicating a limited understanding of growth chart interpretation.[3] Similarly, Rani et al found that inadequate maternal knowledge was associated with delayed detection of undernutrition among children, emphasizing the need for improved caregiver education.[4]

Maternal knowledge regarding growth charts is influenced by several socio-demographic factors, including maternal education, socio-economic status, and access to health services.[5-8] Studies conducted in Karnataka, Maharashtra, and Tamil Nadu have consistently shown that mothers with secondary or higher education demonstrate significantly better understanding of growth monitoring practices compared to those with lower educational attainment.[5,6,8] In addition, socio-economic status influences exposure to health information, interaction with healthcare providers, and access to healthcare services, thereby affecting maternal awareness and utilization of growth monitoring tools.[8,10]

Although growth monitoring services are widely implemented in many parts of India, there is limited published evidence on maternal awareness and knowledge of growth charts in Puducherry, particularly among mothers of children under two years of age attending pediatric outpatient departments.[11-13] Identifying knowledge gaps and socio-demographic determinants in this population is essential for developing targeted health education strategies to improve caregiver understanding and utilization of the growth monitoring tools.

Therefore, the present study was undertaken to assess the awareness and knowledge regarding growth charts and to identify the socio-demographic factors associated with maternal understanding among mothers of children under 24 months attending a tertiary care pediatric outpatient department in Puducherry. Understanding these determinants may help strengthen maternal health education and improve the effectiveness of child growth monitoring practices.

Aim

Aim was to assess the awareness and knowledge regarding growth charts among mothers of children under 24 months and to determine their association with socio-demographic factors.

Objectives

Objectives were to determine the level of awareness regarding growth charts among mothers of children under 24 months, to assess the knowledge regarding growth charts among mothers of children under 24 months, to examine the association between socio-demographic factors and awareness of growth charts and to determine the association between socio-demographic factors and knowledge of growth charts.

METHODS

The study was conducted in the Pediatric OPD under the Department of Community Medicine at Sri Lakshmi Narayana Institute of Medical Sciences and Hospital, Puducherry. Data collection was carried out over a period of three months, from April 1, 2025, to June 30, 2025, using a cross-sectional study design.

The study population included mothers of children aged less than 24 months attending the Pediatric OPD during the study period. A convenience sampling technique was employed, wherein all eligible mothers who attended the OPD and consented to participate were included until the required sample size was achieved.

The sample size was calculated using the formula for estimating a proportion:

$$n = \frac{Z^2pq}{d^2}$$

Based on previous literature by Kumar et al which reported 40% awareness of growth charts among mothers, the proportion was taken as p=0.40 (q=0.60).[3] With an allowable error of 10% (d=0.10) and a 95% confidence level (Z=1.96), the calculated sample size was 92. After accounting for a 20% non-response rate, the final sample size was 110, which was achieved during the study period.

Data were collected using a structured and pretested questionnaire consisting of sections on socio-demographic characteristics, awareness, and knowledge regarding growth charts. Awareness and knowledge were assessed using selected items measured on a 5-point Likert scale, ranging from strongly agree (5) to strongly disagree (1). Reverse scoring was applied for negatively worded items. The total score was calculated by summing individual item responses. Operational definitions were used to categorize participants, and a cutoff of 50% of the maximum possible score was applied to classify awareness and knowledge as adequate or inadequate.

Inclusion criteria comprised mothers of children aged less than 24 months attending the OPD who provided informed consent. Mothers who were unwilling to participate or unable to respond due to illness or communication difficulties were excluded from the study.

Ethical approval was obtained from the institutional ethics committee of Sri Lakshmi Narayana Institute of Medical Sciences and Hospital, Puducherry (Approval No. IEC/C-P/8/2025, dated February 2, 2025). Written informed consent was obtained from all participants after explaining the purpose of the study in their preferred language. Confidentiality and privacy were strictly maintained, and interviews were conducted in a private setting.

The collected data were entered into Microsoft Excel and analyzed using IBM SPSS Statistics version 20.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics such as frequencies and percentages were used to summarize the data. The Chi-square test was applied to assess the association between socio-demographic variables and awareness and knowledge of growth charts. Variables found to be significant in bivariate analysis were further included in multivariate logistic regression analysis to identify independent predictors. A p value of less than 0.05 was considered statistically significant.

RESULTS

Socio-demographic characteristics of the participants, (n=110)

A total of 110 mothers of children aged under 24 months participated in the study. The majority of mothers were aged 22-25 years (n=58, 52.7%), followed by 26-30 years (n=32, 29.1%) and 18-21 years (n=20, 18.2%). Most participants were homemakers (n=73, 66.4%), while 37 (33.6%) were employed. Regarding educational status, 66 mothers (60.0%) had completed Diploma/Higher Secondary education, 25 (22.7%) had a degree, 18 (16.4%) had High School education, and 1 (0.9%) was illiterate. According to the Modified BG Prasad socioeconomic classification, the majority of mothers belonged to the upper class (n=70, 63.6%), followed by upper middle (n=20, 18.2%), middle (n=12, 10.9%), lower middle (n=6, 5.5%), and lower class (n=2, 1.8%).

Regarding child health records, 56 mothers (50.9%) used the SLIMS immunization card, while 54 (49.1%) possessed the government MCP card. Most mothers had one child (n=80, 72.7%), whereas 25 (22.7%) had two children, 4 (3.6%) had three children, and 1 (0.9%) had four children. Half of the children were aged 9-12 months (n=55, 50.0%), while 50 (45.5%) were aged 0-8 months and 5 (4.5%) were aged 13-24 months. Slightly more than half of the children were male (n=64, 58.2%), while 46 (41.8%) were female (Table 1).

Awareness and knowledge of growth charts among mothers (n=110)

Among the 110 mothers, 46 (41.8%) were aware of growth charts, while 64 (58.2%) were not aware (Figure 1). Regarding knowledge, 78 (70.9%) mothers had adequate knowledge, whereas 32 (29.1%) had inadequate knowledge (Figure 2).

Association of socio-demographic factors with awareness of growth charts (n=110)

Overall awareness of growth charts ranged between 40% and 43% across most subgroups (Table 2). With respect to maternal age, awareness was comparable across all age groups-40% among those aged 18-21 years, 43.1% among those aged 22-25 years, and 40.6% among those aged 26-30 years-with no statistically significant association ($p=0.62$). Similarly, occupation showed no significant association with awareness, as 41.1% of homemakers and 43.2% of working mothers were aware ($p=0.81$). Maternal education was significantly associated with awareness ($p<0.001$). None of the illiterate mothers were aware, while awareness increased with educational level-27.8% among High School-educated mothers, 31.8% among diploma/higher secondary holders, and 80.0% among degree holders. Socio-economic status also showed a statistically significant association with awareness ($p=0.028$), with awareness ranging from 35.7% in the upper class to higher proportions in other classes. The number of children, child's age, and child's sex were not significantly associated with awareness ($p>0.05$).

Association of socio-demographic factors with knowledge of growth charts (n=110)

Overall knowledge of growth charts was higher than awareness, ranging between 66% and 76% across most subgroups (Table 3). Maternal age was not significantly associated with knowledge ($p=0.71$), with proportions of 65.0%, 72.4%, and 71.9% in the 18-21, 22-25, and 26-30 year groups, respectively. Occupation also showed no significant association ($p=0.65$), with knowledge reported in 68.5% of homemakers and 75.7% of working mothers. Maternal education was the only variable significantly associated with knowledge ($p<0.001$). None of the illiterate mothers had knowledge of growth charts, while only 27.8% of high school-educated mothers had adequate knowledge. In contrast, knowledge was higher

among diploma/higher secondary (83.3%) and degree holders (72.0%). The number of children, the child's age, and the child's sex were not significantly associated with knowledge (p>0.05).

Multivariate logistic regression for awareness of growth charts (n=110)

On multivariate logistic regression analysis (Table 4), maternal education and socio-economic status emerged as independent predictors of awareness of growth charts. Compared to mothers with high school education (reference group), those with diploma/higher secondary education were nearly three times more likely to be aware (AOR=2.84; 95% CI: 1.12-7.18; p=0.028), while degree holders had over six times higher odds of awareness (AOR=6.52; 95% CI: 2.10–20.21; p=0.001). Mothers belonging to the upper socio-economic class had significantly higher odds of awareness compared to the lower/middle class (AOR=2.41; 95% CI: 1.01-5.72; p=0.047).

Multivariate logistic regression for knowledge of growth charts (n=110)

Multivariate logistic regression analysis for knowledge (Table 5) identified maternal education as the only significant independent predictor. Mothers with diploma/higher secondary education had more than five times higher odds of adequate knowledge (AOR=5.21; 95% CI: 1.87-14.49; p=0.002), while degree holders had 3.6 times higher odds (AOR=3.64; 95% CI: 1.21–10.91; p=0.021). Socio-economic status was not significantly associated with knowledge after adjustment (p>0.05), indicating that education plays a more dominant role than economic status.

Table 1: Socio-demographic characteristics of mothers of children under 24 months (n=110).

Variables	Category	N	Percentage (%)
Mother's age (in years)	18-21	20	18.2
	22-25	58	52.7
	26-30	32	29.1
Mother's occupation	Homemaker	73	66.4
	Working	37	33.6
Mother's education	Illiterate	1	0.9
	High school	18	16.4
	Diploma/ higher secondary	66	60.0
	Degree	25	22.7
Socio-economic class (Modified BG Prasad)	Upper	70	63.6
	Upper middle	20	18.2
	Middle	12	10.9
	Lower middle	6	5.5
	Lower	2	1.8
Health cards	SLIMS immunization card	56	50.9
	Government MCP card	54	49.1
Number of live children per mother	1 child	80	72.7
	2 children	25	22.7
	3 children	4	3.6
	4 children	1	0.9
Child age (months)	0-8 months	50	45.5
	9-12 months	55	50.0
	13-24 months	5	4.5
Child sex	Male	64	58.2
	Female	46	41.8

Table 2: Association of socio-demographic factors with awareness of growth charts (n=110).

Variables	Category	Awareness-Yes, N (%)	Awareness-No, N (%)	P value
Mother's age (in years)	18-21	8 (40.0)	12 (60.0)	0.62
	22-25	25 (43.1)	33 (56.9)	
	26-30	13 (40.6)	19 (59.4)	
Mother's occupation	Homemaker	30 (41.1)	43 (58.9)	0.81
	Working	16 (43.2)	21 (56.8)	
Mother's education	Illiterate	0 (0.0)	1 (100.0)	0.00018*

Continued.

Variables	Category	Awareness-Yes, N (%)	Awareness-No, N (%)	P value
	High school	5 (27.8)	13 (72.2)	
	Diploma/higher secondary	21 (31.8)	45 (68.2)	
	Degree	20 (80.0)	5 (20.0)	
Socio-economic status	Upper	25 (35.7)	45 (64.3)	0.028*
	Upper middle	10 (50.0)	10 (50.0)	
	Middle	7 (58.3)	5 (41.7)	
	Lower middle	3 (50.0)	3 (50.0)	
	Lower	1 (50.0)	1 (50.0)	
Number of children	1	34 (42.5)	46 (57.5)	0.74
	≥2	12 (40.0)	18 (60.0)	
Child age (in months)	0-8	20 (40.0)	30 (60.0)	0.68
	9-12	23 (41.8)	32 (58.2)	
	13-24	3 (60.0)	2 (40.0)	
Child sex	Male	27 (42.2)	37 (57.8)	0.89
	Female	19 (41.3)	27 (58.7)	

*p<0.05 is statistically significant.

Table 3: Association of socio-demographic factors with knowledge of growth charts (n=110).

Variables	Category	Knowledge-Yes, N (%)	Knowledge-No, N (%)	P value
Mother's age (in years)	18-21	13 (65.0)	7 (35.0)	0.71
	22-25	42 (72.4)	16 (27.6)	
	26-30	23 (71.9)	9 (28.1)	
Mother's occupation	Homemaker	50 (68.5)	23 (31.5)	0.65
	Working	28 (75.7)	9 (24.3)	
Mother's education	Illiterate	0 (0.0)	1 (100.0)	0.000004*
	High school	5 (27.8)	13 (72.2)	
	Diploma/higher secondary	55 (83.3)	11 (16.7)	
	Degree	18 (72.0)	7 (28.0)	
Number of children	1	58 (72.5)	22 (27.5)	0.82
	≥2	20 (66.7)	10 (33.3)	
Child age (in months)	0–8	35 (70.0)	15 (30.0)	0.59
	9–12	39 (70.9)	16 (29.1)	
	13–24	4 (80.0)	1 (20.0)	
Child sex	Male	46 (71.9)	18 (28.1)	0.77
	Female	32 (69.6)	14 (30.4)	

*p<0.05 is statistically significant

Table 4: Multivariate logistic regression analysis for factors associated with awareness of growth charts (n=110).

Variables	Category	AOR	95% CI	P value
Mother's education	High school	1.00 (Ref)	-	-
	Diploma/higher secondary	2.84	1.12-7.18	0.028*
	Degree	6.52	2.10-20.21	0.001*
Socio-economic status	Lower/middle	1.00 (Ref)	-	-
	Upper middle	1.96	0.72-5.31	0.18
	Upper	2.41	1.01-5.72	0.047*

*AOR: Adjusted odds ratio; CI: Confidence interval; Ref: Reference category. p<0.05 considered statistically significant.

Table 5: Multivariate logistic regression analysis for factors associated with knowledge of growth charts (n=110).

Variables	Category	AOR	95% CI	P value
Mother's education	High school	1.00 (Ref)	-	-
	Diploma/higher secondary	5.21	1.87-14.49	0.002*
	Degree	3.64	1.21-10.91	0.021*
Socio-economic status	Lower/middle	1.00 (Ref)	-	-

Continued.

Variables	Category	AOR	95% CI	P value
	Upper middle	1.38	0.51-3.75	0.52
	Upper	1.72	0.68-4.31	0.25

*AOR: Adjusted odds ratio; CI: Confidence interval; Ref: Reference category. p<0.05 considered statistically significant.

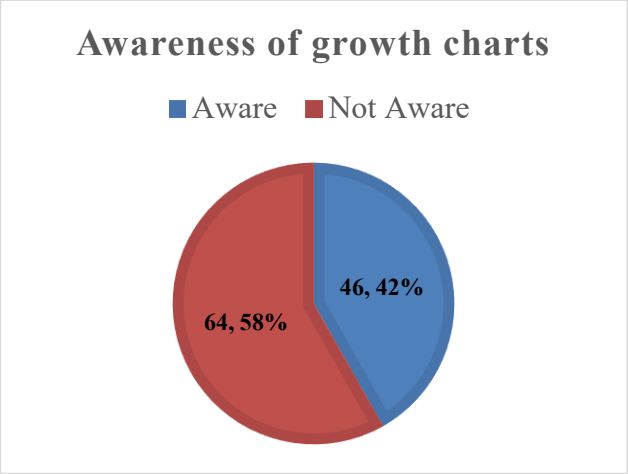

Figure 1: Distribution of mothers based on awareness of growth charts (n=110).

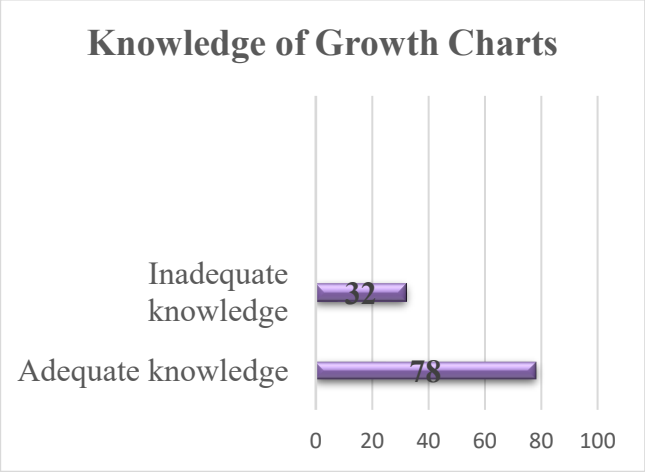

Figure 2: Distribution of mothers based on knowledge of growth charts (n=110).

DISCUSSION

The present study assessed the awareness, knowledge, and socio-demographic determinants of growth charts among mothers of children aged under 24 months attending a tertiary care facility. The findings revealed that awareness of growth charts was relatively low (41.8%), whereas a higher proportion of mothers demonstrated adequate knowledge (70.9%).

This observed gap between awareness and knowledge suggests that although many mothers may possess a general understanding related to child growth, specific awareness of growth charts as a monitoring tool remains limited. This may be attributed to indirect exposure through healthcare services such as immunization visits.

Similar findings have been reported in studies conducted in Karnataka and Gujarat, where awareness levels were below 50% among mothers.[14,15]

Maternal education emerged as the most significant determinant of both awareness and knowledge in the present study. Mothers with higher educational attainment demonstrated significantly higher levels of awareness and knowledge, and this association remained strong after multivariate analysis. These findings are consistent with studies conducted in Tamil Nadu and Andhra Pradesh, which have reported that maternal education plays a crucial role in improving understanding and utilization of growth monitoring tools.[16,17] Higher education likely enhances comprehension, access to health information, and interaction with healthcare providers.

Socio-economic status was found to be significantly associated with awareness but not with knowledge after adjustment. Mothers belonging to higher socio-economic classes had greater awareness, possibly due to better access to healthcare services and information. However, the lack of an independent association with knowledge suggests that economic advantage alone may not ensure deeper understanding. Similar findings have been reported in studies from Rajasthan and Kerala.[19,20]

The present study did not find any statistically significant association between awareness or knowledge and maternal age, occupation, number of children, or child-related factors such as age and sex. This indicates that awareness and knowledge are not passively acquired through maternal experience but require structured health education. Comparable findings have been reported in studies conducted among urban populations in India.[21,22]

The finding that none of the illiterate mothers had awareness or knowledge of growth charts further highlights the critical role of literacy in health information uptake. Illiteracy acts as a major barrier to understanding health education materials and utilizing growth monitoring tools effectively. Similar observations have been reported in rural settings in India.[23]

CONCLUSION

The study found that although most mothers had adequate knowledge about growth charts, awareness of growth charts was low. Maternal education was the most important factor associated with both awareness and knowledge, while higher socio-economic status was associated only with awareness. These findings suggest that health education and counselling on growth charts should be strengthened during antenatal, postnatal, immunization, and well-baby clinic visits, especially for

mothers with lower educational levels. This may help improve growth monitoring and support early detection of growth problems in young children.

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