

Pre-School Children Mother's Awareness and Application of the Growth Curve in Japan

Takako Kumagai¹, Haruyuki Ito² & Yukiko Mano³

Abstract

In Japan, growth charts for use until children reach 18 years of age are included in Maternal and Child Health Handbooks. However, the charts are not used actively after children reach school age. Little is known about the reasons. The purpose of this study was to ascertain the usage of growth charts by mothers of nursery school students shortly before students' entrance into elementary school and mothers' attitudes toward the use of growth charts in order to aid initiatives that promote the long-term use of growth charts. The subjects were 465 mothers and their nursery school-aged children (3-6 years) for whom continuous somatometric measurements were available. A total of 32.5% of the mothers utilized growth charts (primiparous: 36.4%, multifarous: 29.0%), of whom 28.8% of primiparous mothers used them once every six months and 32.4% of multifarous mothers, once a year. At 18.0%, "I am not concerned about my child's physique" was the most common reason for not utilizing growth charts. To ensure the long-term use of growth charts, it is necessary to provide mothers with health guidance designed to emphasize the importance of assessing their children's physiques and to encourage the practice of keeping periodic records

Keywords: Growth chart, Maternal and Child Health Handbook, Personal child health record, Preschool child, Obese, Underweight.

1.0 Introduction

Growth charts represent one way of monitoring a child's growth. In Japan the Maternal and child Health Handbooks distributed to mothers when a pregnancy notification form is filed at municipal government office contain a growth chart that can be used to plot a child's growth until the age of 18 years (Nakamura, 2010). Mothers are provided with an explanation of how to use the growth chart when the child has a medical examination. The reported usage rates for Maternal and Child Health Handbook growth chart are as follows: 55.6% (Hokama et al, 2000) in mothers of children aged 3 to 5 months, 53.9% (Takeda et al, 2001) in mothers of children aged 10 months, 78.4% (Fujimoto et al, 2001) in mothers of children aged 1 year 6 months, and 42.0% (Aoki et al, 2009) in mothers of children aged 0 to 5 years. Research indicates that growth charts are almost never used by mothers of children aged 3 years and older. Few mothers draw the graphs themselves once their children reach the age 3 years because records are kept by the nursery schools and kindergartens (Kobayashi et al, 2005).

However, problems related to children's physiques such as obesity and being unhealthily underweight are on the increase. Because childhood obesity leads to adult obesity and because underweight children may be suffering from anorexia nervosa or other disorders, health maintenance is an issue of long-term importance beginning with infancy. However, much about those issues currently remains unknown because no studies have been done on the usage of growth charts by mothers of older preschool children, or on the reasons those mothers do not utilize growth charts, and also on the ways those mothers monitor their children's growth when they do not utilize growth charts.

¹Assistant professor and registered dietitian, PhD, Aomori University of Health and Welfare Department of Nutrition.

²Lecturer and registered nurse, PhD, Tenshi College Department of Nursing, Japan.

³Professor and registered dietitian, Tohoku Women's Junior College Subject Living Science, Japan.

Thus, in order to obtain basic data that could aid in effort to encourage the continuous use of growth charts, the purpose of this study was to learn the percentage of mothers who used growth charts for their preschool-aged children, their reasons for not using growth charts, and other methods they used for monitoring their children's growth.

2. Methods

2.1 Subjects

The subjects of this study were selected by sending requests to nursery schools in Aomori Prefecture for consents to participate in the study. An initial group of 650 preschool children who attended nursery schools that granted consent and their mothers were identified as potential subjects. After excluding those pairs that had missing data, we selected 465 pairs of preschool children and their mothers as the final subjects. Children that were born between April 1, 2007 and March 31st, 2008, were all 6 years old when they graduated from nursery school in March 2014. This study was conducted with the approval of the ethics committee of the Aomori University of Health and Welfare.

2.2 Somatometric measurements

Records of the children's growth were obtained from Maternal and Child Health Handbooks, and somatometric measurements were performed by the nursery schools. The pairs selected as the subjects were those included children whose somatometric measurements for the age range "3 to under 6 years" were taken continually during the period between nursery school entrance and graduation.

2.3 Survey of attitudes toward the use of growth charts

The survey consisted of questions on the following issues related to the current usage of growth charts by mothers: (a) whether or not the mothers used growth charts at home, (b) how often they used growth charts, (c) their reasons for not using growth charts (open-ended responses), and (d) methods other than growth charts that they used to assess their children's physiques.

2.4 Analytic methods

We used descriptive statistics on items related to the clinical characteristics of the mothers and children and the usage of growth charts by primiparous and multiparous mothers.

3. Results

The clinical characteristics of the subjects (mothers and children) are shown in Table 1.

Table 1: Clinical characteristics of mothers and children

	Primiparous mothers (n=220)	Multiparous mothers (n=245)
Current age of the mother (y)	33.5±5.0	37.6±4.3
Age-group: 20s	51 (23.2)	14 (5.7)
30s	143 (65.0)	155 (63.3)
40s	26 (11.8)	76 (31.0)
Job: Homemaker	18 (8.2)	13 (5.3)
Company employee	73 (33.2)	76 (31.0)
Part-time or temporary worker	96 (43.6)	94 (38.4)
Civil servant	15 (6.8)	29 (11.8)
Other (self-employed, farmer, nurse, etc.)	18 (8.2)	33 (13.5)
Children Boys	115 (52.3)	110 (44.9)
Girls	105 (47.7)	135 (55.1)
Gestational age at birth (weeks)	38.8±2.0	38.6±2.2
Low-birth-weight infants	30 (13.6)	27 (11.0)
Continuous obesity until the age of "3 to under 6"	14 (6.4)	14 (5.7)

Mean± Standard Deviation

Figures are shown as mean standard deviation and n (%). Low birth weight is defined as birthweight less than 2500 g. Obesity is defined as height and weight 15% or more above the standard. The study sample included 6 groups of twins and 3 groups of triplets. The birth order ratios of the children were as follows: 220 (47.3%) were firstborn, 165 (35.5%) were second born, 69 (14.8%) were third born, and 11 (2.4%) were fourth born. Fifty-seven (12.3%) children were low-birth-weight infants. Data concerning mothers' usage of growth charts are shown in Figure 1.

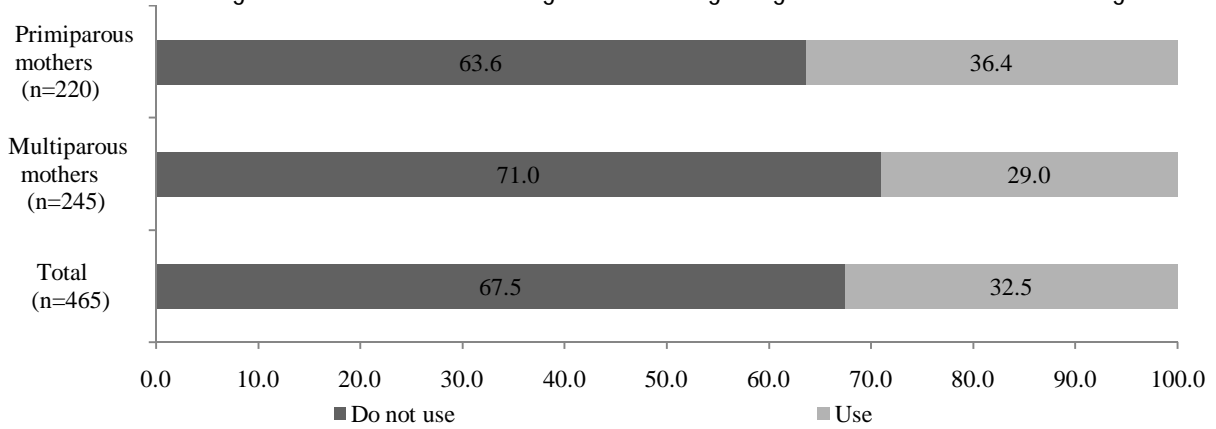


Figure 1:Growth chart usage (%)

A total of 151 (32.5%) mothers used growth charts: 80 (36.4%) primiparous mothers and 71 (29.0%) multiparous mothers. A total of 314 mothers (67.5%), 140 primiparous mothers (63.6%) and 174 multiparous mothers (71.0%) did not utilize growth charts. The frequency with which mothers who used growth charts kept records is shown in Figure 2.

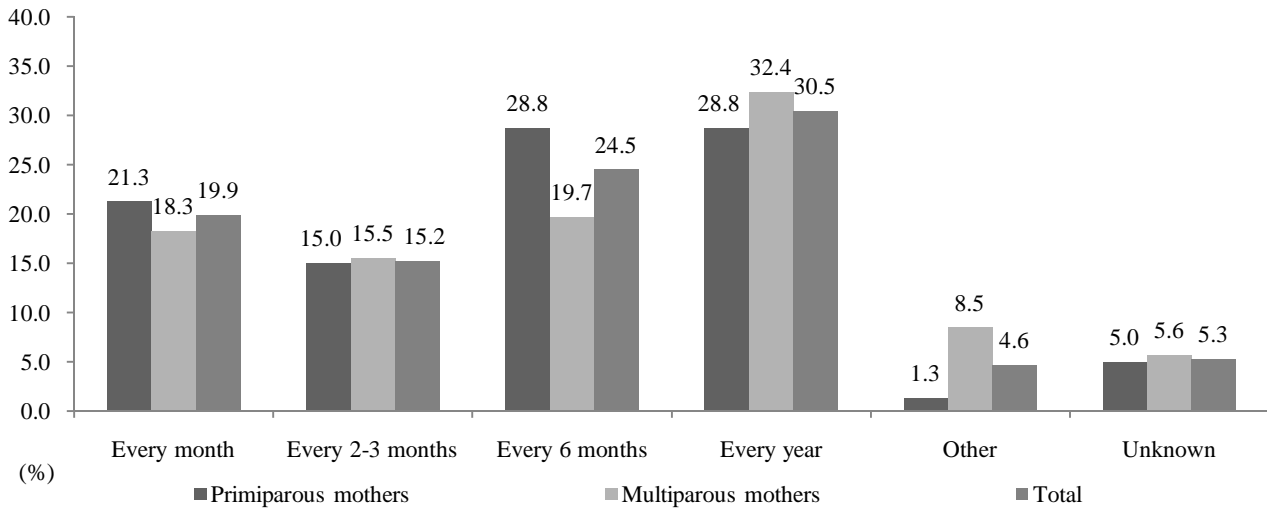


Figure 2: Frequency of growth chart use

The highest percentages were for primiparous mothers who kept records every six months (23 mothers, 28.8%) and multiparous mothers who kept records once per year (23 mothers, 32.4%). The reasons for not using growth charts are shown in Figure 3. Of the 285 mothers who responded that they did not use growth charts, 23(18.0%) primiparous mothers and 29 (18.5%) multiparous mothers (total of 52 mothers, 18.2%) responded, "I am not concerned about my child's physique." Twenty-eight (21.9%) primiparous mothers and 20 (12.7%) multiparous mothers (total of 48 mothers, 16.8%) responded, "Measurements (are) taken by the nursery school." Fifteen (11.7%) primiparous mothers and 21 (13.4%) multiparous mothers (total of 36 mothers, 12.6%) responded, "My child is neither underweight nor obese." No primiparous mothers selected "Each child grows at his or her own pace" as their reason. A total of 14 (4.9%) mothers responded, "I no longer use the Maternal and Child Health Handbook." The methods used by mothers who do not use growth charts to ascertain their children's growth are shown in Figure 4.

Nearly the same percentages of primiparous mothers and multiparous mothers (53.0% and 54.2%, respectively; total of 80 mothers, 53.7%) responded, "I use the measurements taken at nursery school." Twelve (8.1%) mothers responded, "I compare my child with other children of the same age," and "[I use] the body weight scale at home," and 9 (6.0%) mothers responded, "Appearance."

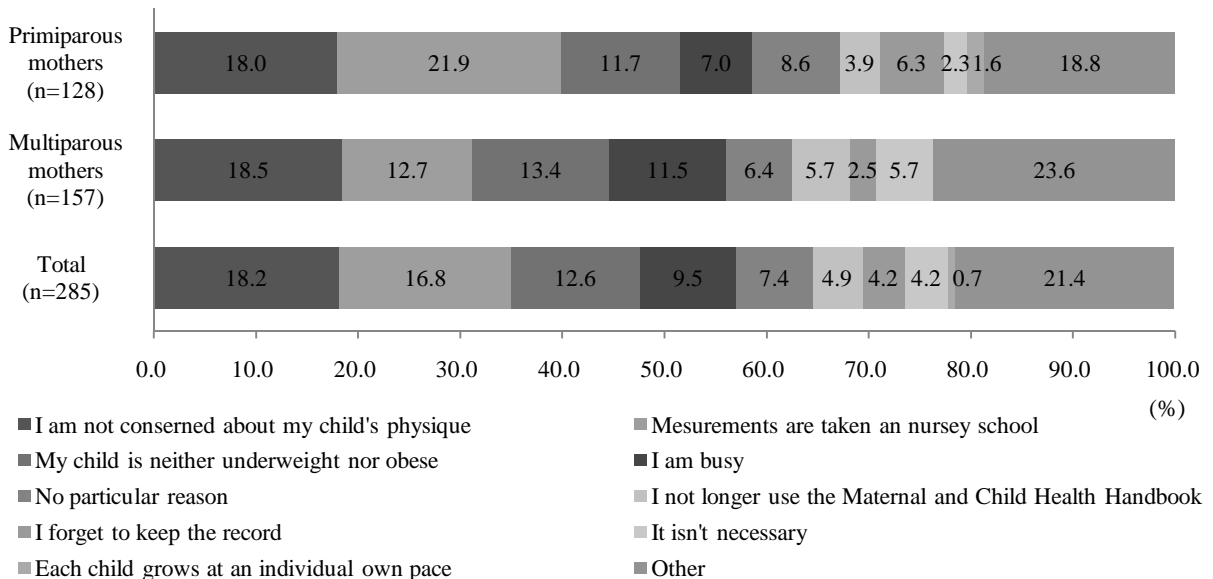


Figure 3: Reasons for not using growth charts

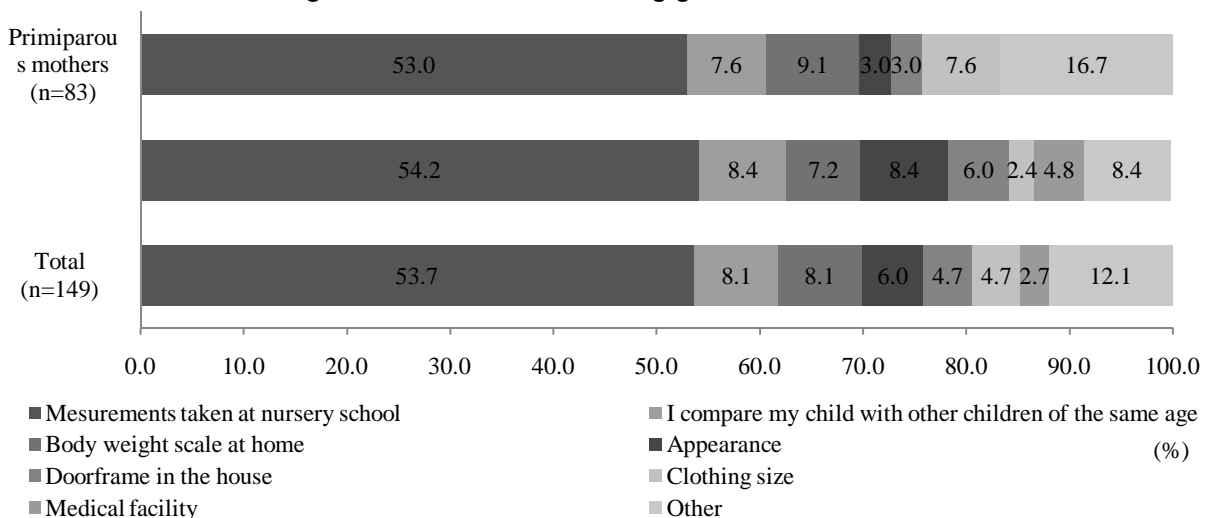


Figure 4: Methods of ascertaining growth and development other than the growth chart

4. Discussion

The results of the survey indicated that 32.5% of mothers of preschool-aged children used growth charts and that the percentage of primiparous mothers who used growth charts was higher than that of multifarious mothers. The highest percentages of usage frequency were for primiparous mothers who used growth charts every six months and multiparous mothers who used them once per year. The most common reason for not using growth charts was, "I am not concerned about my child's physique," and the most commonly used method of ascertaining their children's growth other than growth charts was "Measurements taken at nursery school." Usage percentages were lower in comparison to those in previous studies conducted in Japan (Hokama T et al, 2000; Takeda M et al, 2001; Fujimoto S et al, 2001; Aoki M et al, 2009).

However when comparing the results of studies in Brazil (Abud SM et al, 2015; Palombo CN et al, 2014) our results are higher as only 9% of those studies Child healthcare handbook (CHH) contained growth charts. In our survey of the usage of the Maternal and Child Health Handbook by mothers whose children had the 1-year-6-month infant health examination, most mothers reported that in the Maternal and Child Health Handbook, the most helpful record for them was the "immunization record" but they felt that the growth charts were not helpful although they kept records in it (Fujimoto et al, 2001). In addition, 42% of the mothers of nursery school students aged 0 to 5 years responded that they made entries into the growth chart included in the Maternal and Child Health Handbook, yet only 34% of mothers responded that they recorded their children's height and weight at times other than when the children underwent medical examinations (Aoki et al, 2009). It is therefore possible to infer that because the number of medical examinations decreases as children age and develop, mothers become less interested in keeping records as their children develop. Our investigation of frequency of the use of growth charts indicated that primiparous mothers used them every six months, and multiparous mothers used them once per year.

Even though Maternal and Child Health Handbooks include physique assessments that utilize growth charts as well as height and weight measurements for infants and children and that are organized at age intervals and to coincide with intervals between medical examinations, we infer from our data that once a child stops undergoing regularly scheduled health examinations, mothers begin to keep records with less frequency. We believe the reasons mothers stop using growth charts include the end of regularly scheduled health examinations, the birth order of the child, and the mother's level of experience in rearing children. The Children's Health Examination Manual (revised edition) stipulates that once children reach school age, growth charts should be used once every 3 to 4 months (Japanese Society of School Health, 2010). Once a child has undergone the three-year health examination, it is necessary to record the child's measurements on the growth chart every month or at least once every 3 or 4 months. Many mothers said (a) they do not use growth charts and (b) their methods for assessing their children's physiques were other than the use of growth charts because "I use the measurements taken at nursery school." The "Measurements taken at nursery school" and "(weight as measured by a) weighing scale at home" were used as data to make judgments regarding their children's physiques.

However, the reasons given for not using the growth chart were, "I am not concerned about my child's physique," "My child is neither underweight nor obese," "I compare my child with other children of the same age," and "Appearance," all of which are subjective judgments. The use of such subjective standards is risky because mothers may be late in noticing not only the start of obesity or underweight trends in their children but also abnormalities in their children's growth and development. Because each child grows at an individual pace, it is important to consistently record children's height and weight measurements on growth charts and not rely on appearances. Preschool facilities and schools also use growth charts to manage children's health. According to the Dietary Reference Intakes for Japanese (2015 edition), the basic concept behind weight management is "the use of distribution curves (growth charts) for the heights and weights appropriate to Japanese infants and children by age and sex (Ministry of Health Labor and Welfare, 2014)." Nutrition Management Guidelines and Advice for Designated School Lunch Facilities" advises the use of growth charts to assess children in the "3 to under 6 years" age-group and recommends that there be less than 5% obese or underweight children in the facility they serve (Ministry of Health, Labor and Welfare. Health Service Bureau, 2013). The Ministry of Education, Culture, Sports, Science and Technology has revised some of the enforcement regulations of the School Health and Safety Act and now recommends that height and development curves be actively used to ascertain students' health (Ministry of Education, Culture, Sports, Science and Technology Sports and Youth Bureau School Health Education Division, 2014).

It is important that schools and other facilities involved in the growth process of children make multidisciplinary efforts to manage the growth and development of children. The limitation of this study was the fact that it was unable to elucidate alternative methods used to access growth charts. Growth charts are not only listed in the Maternal and Child Health Handbook but are also available on computers and via Smartphone applications (apps). It is possible that growth charts are being accessed and used via these alternative methods. This remains a topic for future study.

To ensure the long-term use of growth charts in order to assess children's growth and to assess their physiques against standards, it is important that the following health guidance be provided for mothers when Maternal and Child Health Handbooks are distributed: (a) the recording of somatometric data by means of growth charts, (b) the continued use of growth charts even after scheduled health examinations are completed and the child graduates from a preschool facility, and (c) periodic assessment of growth charts without relying on birth order or appearance. It is also important that public workers involved in the growth and development of children provide information and support for parents and guardians as a way of promoting understanding of the importance of assessing children's physiques and of using growth charts.

5. Conflict of Interest

The authors have declared no conflicts of interest.

6. Acknowledgements

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