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Developing and Feasibility of Compass Model for Parents in Monitoring Children's Growth

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ABSTRACT

Introduction: Malnutrition during the first 1000 days of life, spanning from conception to two years old, poses a risk of enduring health issues, impacting both short-term and long-term well-being. Based on the Indonesian Toddler Nutrition Surveillance Status in 2021, the stunting prevalence rate in North Sumatra is estimated to be at 25.8 percent. Therefore, this research aimed to explore the benefits of child growth charts to make it easier for mothers to detect growth among toddlers aged 0-2 years. The Compass Model would motivate parents to consistently monitor the nutritional status of children in line with age to avoid stunting. **Methods:** Qualitative and quantitative methods were used, while the sample consisted of 257 individuals. Data was collected through in-depth interviews with lecturers and pediatricians as experts. **Results:** The results showed that the validity and reliability tests yielded significantly positive outcomes. Based on the interviews with pediatricians and lecturers, misunderstanding often leads to a lack of awareness among mothers regarding the growth and development of children. **Conclusion:** The Compass Model was found to be helpful as a new tool for mothers to monitor the growth of children. This was attributed to its ease of use and user-friendliness for midwives and mothers who could read the result of the change.

Keywords: Effectiveness Compass Model; The Perceive Compass Model; Toddlers' Growth

INTRODUCTION

Children and parents are an inseparable unit in supporting growth and development; hence, the background of parents also affects the parenting pattern. In order to keep children from stunting, mothers play a critical role during the golden period. Even though there is no fetus during the conception stage, early maternal nutrition strengthening is necessary to prepare the mother's body for the prenatal phase of fetal development, which lasts from toddlerhood to adolescence (Saleh *et al.*, 2021). Food and nutrition given to children can be influenced by several aspects, such as the educational background of the parent, the economic condition of the family, and the social environment (Hamner *et al.*, 2022). Malnutrition throughout the first 1000 days of life, from conception to, two years of age potentially results in both short- and long-term health issues (Ahmad *et al.*, 2018). In Indonesia, several cases of malnutrition have been recorded and remain prevalent (Effendy *et al.*, 2020). Recent studies indicate that childhood malnutrition has long-term effects on health, growth, cognitive abilities, and productivity in adulthood, leading to measurable economic consequences (Ghodsi *et al*., 2021).To address this issue, applications were developed to help parents, midwives, and other health workers monitor the nutrient development of pregnant women and the growth of toddlers for stunting prevention (Hijrawati *et al.*, 2021). Mothers can utilize the Compass Model, designed to monitor infant growth from 0 to 24 months, for optimized outcomes and reduced stunting, benefiting from its simple tool that allows direct tracking by providing a clear standard for assessing growth and development (Lufthiani *et al.*, 2023).

Stunting is a condition characterized by chronic malnutrition resulting from inadequate nutritional intake for an extended period due to feeding inconsistency with dietary needs. Basic Health Research Data (Riskesdas) in 2019 stated that the prevalence of stunting nationally was 27.67%. Although there has been a decrease of 3.1% in 2018 by 38.8%, this figure still needs to be lowered. The prevalence of stunting is higher than that of

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underweight or poor nutrition (16.29%) and underweight (7.44%) among under-five children in Indonesia (Kementerian Kesehatan RI, 2020). The stunting prevalence rate in Central Java in 2019 was 30%, reducing from 34.3% in 2018 and 37.6% in 2017. Rural working mothers in Indonesia have a higher likelihood of having stunted toddlers. Urban areas show more advanced growth, with a disparity in development and access to health services persisting over time. (Laksono *et al.*, 2022).

The problems formulated in this research were based on the observations of health workers that most mothers and fathers often use monitoring tools only until the child reaches 12 months old, coinciding with required immunizations. Thus, it is important to monitor child growth and promote initiatives that identify and address growth issues, enhance feeding practices for infants and children, and encourage the use of health services among children under five in low- and middle-income nations. (Shah & Khang, 2023; Taylor *et al.*, 2023). After this stage, parents rarely bring children to health workers to monitor their growth and development. The novelty of this research lies in the introduction of the Compass Model as a new tool in addition to the existing Health Care Card (Kartu Menuju Sehat/KMS) only used by Integrated Health Post (Pos Pelayanan Terpadu/Posyandu) cadres. The Compass Model can be used by mothers who have children aged 0–2 years. So, the Compass Model serves as an accessible tool for mothers to track their children's growth, providing a user-friendly interface that is easily interpretable by both midwives and mothers (Damanik *et al.*, 2023).

METHODOLOGY

This research used mixed methods, combining the collection of quantitative and qualitative data, to gain more complete results. The quantitative data were collected in the first phase to identify respondents for the qualitative data caching phase (Cresswell, 2012). The subsequent subsections further discussed the quantitative and qualitative methods applied. When gathering information or monitoring an informant, the quality of the data acquired relies on their personal qualities, determining the validity of the data. In this research, multiple specialized doctors in the Medan area were surveyed, leading to the identification of a standout pediatrician. This pediatrician was selected based on extensive experience with various test tools, including the Compass model, as well as more than 10 years of experience as a pediatric specialist. Furthermore, the pediatrician showed a deep understanding of the topics discussed in the research. The respondents in the qualitative data collection were expert informants, including one pediatrician and four lecturers specializing in neonates, infants, and children in the early years of life. The validity and reliability of the Compass Model were also analyzed to determine its effectiveness and the credibility of the data in detecting growth in children.

Ethical Consideration

This research received ethical clearance from the health research ethics committee of the Faculty of Medicine, Muhammadiyah University of North Sumatra, Indonesia with Ethical Approval No.408/KEPK/FKUMSU/2020 on March 8, 2020.

RESULTS

The results showed the development of the Compass model as a parental guide in monitoring the growth of children and the perception of mothers towards the model. The effectiveness of tracking growth in children was determined by interviewing a pediatrician and four lecturers working at a separate public health center in Padang Bulan. The result of the second interview was collected to support the discussion among mothers.

Table 1: The Result of Interviews with Pediatricians and Lecturers

No.	Experts	Evaluation of the Compass Model	Application of Health Care Card in the Community	The Consequences of Lacking Comprehension of Health Care Card	What Additional Measures May be Implemented to Guarantee The Long-Term Viability of The Compass Model?
1.	Pediatrician	Simple and complete	Unread voluminous tome	A significant number of children suffer from maternal neglect, resulting in malnutrition.	Integrated Health Post offers door prizes and complimentary food.

2.	1st Lecturer	Can be readily comprehended by the general populace	Less used	The child category is experiencing undernourishment.	Integrated Health Post organizes the distribution of additional food using the social gathering method.
3.	2nd Lecturer	user-friendly	Abstain from perusing the elucidation and portrayal of the child's growth and development.	Society lacks the ability to identify child malnutrition.	Organize an Integrated Health Post offers door prizes and complimentary food
4.	3rd Lecturer	Readily comprehensible to the medium socioeconomic group.	Unappealing and complex, hence failing to capture the mothers' attention.	Many individuals are unaware that food processing is more beneficial for youngsters due to a lack of understanding of reading curves.	Creating homemade peanut butter at Integrated Health Post.
5.	4th Lecturer	Convenient for homemakers.	Not fully used to its maximum potential.	I am unable to comprehend the metrics used to quantify the progression and maturation of an entity.	The level of activity in Integrated Health Post campaigns on social media has increased.

Source: processed by Researcher, 2022

In question two, the opinions of experts regarding health care card usage in society were neither valuable nor purposeful. Therefore, the effects of the misunderstanding led to ignorance in mothers about children's growth and development, as stated in the following question: The experts suggested that health workers should make some breakthroughs to increase the interest of mothers in attending Integrated Health Post every month. The recommendations include offering rewards, organizing social gatherings with prizes, providing free-mung beans and sweet porridge, hosting grocery fairs, and launching active campaigns on social media dealing with awareness of children's growth and development.

Table 2: Characteristics Data of Respondents

Quest	**Age**		**Level of Education**			**Occupation**			**Income**	
Category	25-30	31-36	Bachelor	Secondary School	Junior High School	Housewives	Entrepreneurs	Civil Servants	Lower 2 Million	Upper 2 Million
Freq.	200	57	75	157	25	151	82	11	123	134
%	77.82	22.18	29.2	61.1	9.7	58.8	31.9	4.3	47.9	52.1

Source: processed by Researcher, 2022

Table 2 shows that out of the 257 mothers, the majority, namely 61.1% or 157, graduated from secondary school, while 29.2%, or 75, had bachelor's degrees. Furthermore, most mothers (8%) were housewives, the minority (4.3%) were civil servants, and the remainder were entrepreneurs. Regarding the average monthly income, 47.9%, or 123 of 257, had family monthly income lower than $2 million, and 134, or 52.1%, were earning above $2 million monthly. The Kolmogorov-Smirnov test was used to assess the normality of the data distribution. Based on the results, the significance value of the data was greater than the specified standard, namely 0.01 (0.315 > 0.01), signifying a normal distribution. Each variable consisted of 4 to 5 statements

answered by the respondents. The data showed that the items in the instruments were valid and could be used for the upcoming research. Furthermore, Cronbach's alpha was used to analyze data reliability using surveys with several Likert scale questions. The results showed that each item had an average rating of 0.7, considered appropriate.

DISCUSSION

This research focused on analyzing data to provide insights into the benefits of growth charts, aiming to facilitate mothers effective monitoring of child growth.The Compass Model was identified as a new tool for mothers to notice and understand development reports. Based on the interview results with five experts, spreading 257 questionnaires, the Compass Model helped mothers appreciate the growth and development of their children every month to decrease malnutrition in society.

In the analysis of the questionnaires, the data was subjected to a reliability test by using the Likert scale, Pearson's correlation matrix and Cronbach's alpha. The results indicated that the respondents perceived the Compass Model as an effective tool for assisting parents in monitoring the growth and development of children. Before conducting the reliability test, validity testing was conducted on the statements.

In assessing the validity, statement 1 yielded a result of 0.885, while statements 2, 3, and 4 scored 0.830, 0.916, and 0.904, respectively. Accordingly, each instrument item was valid and could be a reference for upcoming research. In the development of the validity test, statement 1 yielded a result of 0.833, while statements 2, 3, 4, and 5 scored 0.717, 0.845, 0.847, and 0.819. Therefore, the data showed that the items were valid and could be used for the upcoming research. In the use of a validity test, statement 1 yielded a result of 0.802, while statements 2, 3, 4, and 5 scored 0.723, 0.74, 0.645, and 0.805. Consequently, the items were considered valid and could be used for upcoming studies.

The growth reliability test showed that the Cronbach's alpha result for four items of the instruments answered by 257 respondents was 0.906. Given that the value was higher than 0.7 or 0.8, the reliability level of growth was considered excellent, with each item having an average of 0.8. In addition, the reliability test showed that the Cronbach's alpha result for five items of the instruments answered by 257 respondents was 0.871. Considering the value was higher than 0.7 or 0.8, the reliability level was considered acceptable, with each item having an average of 0.8. In the reliability test, the Cronbach's alpha result from the five items of the instrument was 0.801. Given that the value was higher than 0.7 or equal to 0.8, the reliability level was considered good, with each item having an average of 0.7.

The Health Care Card and the Compass Model are methods for keeping track of development and progress in children. These two tools share a similar function but differ in use. Based on the results, health care cards were filled out by Integrated Health Post cadres, but mothers were not always informed about the growth of their children. In contrast, the Compass model allows mothers to personally understand and track children's growth, providing flexibility as it can be used anywhere without the need for Integrated Health Post visits.

A typical growth curve based on the anthropometric weight index for age is represented on a health care card. Through this card, mothers may learn about food categories consistent with balanced nutrition requirements and advice on healthy feeding for optimal growth and development. Given the importance of the information, every mother should have a health care card.

The results of the interview showed that 62.5%, or five mothers, were puzzled and lacked understanding in reading the Health Care Card; 25%, or two, mentioned the susceptibility to tearing and damage; and approximately 12.5% underscored the crucial role of children's reading progress reports. Furthermore, eight mothers reported several weaknesses of the health care card, including inefficiency and misunderstandings about its use, resulting in their preference for the Compass model. The opinion regarding this model was positively acceptable as it is more efficient, understandable, and complete.

Previous research showed that there was a statistically significant relationship between the two variables. The more positively mothers approach health care cards, the better their child's growth. The growth chart

module enhances mothers' understanding of monitoring their toddlers' growth. Training has also been effective in increasing mothers' knowledge in this area. Nutrition education can also improve mother's nutritional knowledge (Al Rahmad *et al.*, 2022; Mitra *et al.*, 2020).

A study showed that there was improvement in parental self-set learning goals, regardless of their category or level of parental stress. The study indicated that online mother–parenting training is beneficial for mothers with toddlers, as it helps them achieve their parenting goals, irrespective of their stress levels or specific goals. (Boekhorst *et al.*, 2021) found a correlation between the characteristics of mothers and toddlers and the utilization of health care cards in the Maternal and Child Health Book. There was a very weak correlation between the under-five mother age (s = 0.101) and education (s = 0.105), as well as between job (s = 0.166), knowledge about children (s = 0.287), and attitude (s = 0.285). It was suggested that Kedungmundu Health Center might inform or counsel mothers on the significance of using Health Care Card data in the Maternal and Child Health Book about early baby development disorder identification through community activities including Integrated Health Post activity, Family Welfare Empowerment (Pemberdayaan Kesejahteraan Keluarga/PKK) meetings, or groups (Boekhorst *et al.*, 2021).

In this research, the results also showed that most respondents, namely 61.1%, or 157 out of 257 mothers, graduated from secondary school, while 29.2%, or 75, had bachelor's degrees. Regarding occupation, the majority (58.8%) were homemakers, the minority (4.3%) were civil servants, and the remainder were entrepreneurs. Therefore, the level of education and employment can affect the way of thinking and caring about the growth of children.

A health care card may only be used by cadres who have received training from health workers; hence, mothers only receive information on their children's development from cadres. As stated in a journal article health institutions should use direct instruction, which has proven to be more effective. In addition, educational institutions are advised to always provide resources, such as books and teaching aids, supporting the implementation of teaching models that may improve expected outcomes.

The Health Care Card, which displays a child-standard growth curve based on the anthropometric index of body weight by age, is frequently overlooked by mothers and health professionals. Toddler mothers often avoid using a health care card due to concerns about it getting lost. Mothers must comprehend the weight increase chart to take prompt action when the development of a child deviates from normal.

The development of Health Care Card into a mobile-based application is referred to as Mobile-KMS or M-KMS "Mobile Card Application to Healthy (M-KMS)". The research aimed to develop an Android-based Mobile Application for Health Cards (M-KMS), allowing parents to monitor the health history of toddlers. Application development was carried out using the C# language and the Xamarin framework. The research produced a user-friendly application that stores the health history of toddlers on an Android-based mobile device (Hijrawati *et al.*, 2021).

Plus, breastfeeding is a great way for a mother to bond with her baby physically and mentally. However, 57.2% of them preferred formula-feeding for the baby while mother is away and felt it as healthy as breast milk. Although the men were generally supportive of breastfeeding, majority (58%) did not support breastfeeding in the public places. (Al Furaikh & Ganapathy, 2018). The health care card, which is still in paper form, has the disadvantage of being easily lost or damaged. It is also ineffective when the officers intend to find data on child development. This paper presents a comparison of several existing digital health care cards as the first step in making a better version by comparing the advantages and disadvantages of each. From seven research articles and two implementations of digital health care cards in Indonesia, five digital health care cards are worth comparing based on their features, including the quality of storing children's growth histories.

CONCLUSION

The present study shows that mothers from uneducated academic backgrounds showed an improved understanding and meaning of the diagram representing the growth and development of children through the

Compass model. Experts also underscored the sustainability of this new model, suggesting its continued use for reducing expenses. The Compass model, with its numerous advantages and user-friendly features, empowers mothers to stay vigilant and attentive to their children's growth and development. This model is a valuable tool not only for midwives but also for mothers who can read the results.

Conflict of Interest

The authors declare that there are no conflicts of interest.

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