Effectiveness of the Stunting Education and Anticipation System on Improving Knowledge, Attitudes, and Practices of Mothers about Stunting; A Case Study of Pekanbaru City

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ABSTRACT

Aims Because low levels of maternal knowledge can cause stunting, developing an education system and web-based stunting anticipation system is needed to increase mothers' ability to improve stunting prevention efforts. This study aimed to evaluate the effectiveness of the Education System and Stunting Anticipation on mothers' knowledge, attitudes, and practices in preventing stunting in Pekanbaru City.

Materials & Methods This research adopted a quantitative analytic approach using a quasi-experimental pre-and post-test design with controls. The study was conducted in the working area of Rejosari Health Center for the intervention group and Sapta Taruna Health Center for the control group from April to July 2022. There were 148 mothers in each group. The intervention group received exposure to the Education System and Anticipation of Stunting. The Wilcoxon and Mann-Whitney tests were used to analyze data.

Findings Before the intervention, the mean ranks of knowledge, attitude, and practice were 27.47, 51.39, and 30.88, respectively. After the intervention, the mean ranks of knowledge, attitude, and practice reached 71.50, 61.46, and 35.54, respectively. The increase in scores in the intervention group was significantly higher than the control group (p<0.001).

Conclusion Implementing the Stunting Education and Anticipation System effectively increases mothers' knowledge, attitudes, and practices in stunting prevention.

Keywords Stunting; Education; Knowledge; Attitude; Practice

CITATION LINKS

[1] The implementation of nutrition improvement programs for underweight children, wasting and stunting in the Department of Health ... [2] Peta Jalan Percepatan Pencegahan Stunting ... [3] Indikator Program Kesehatan Masyarakat dalam RPJMN dan Renstra Kementerian Kesehatan ... [4] Rencana Strategis ... [5] Buku Saku Hasil Studi Status Gizi Indonesia ... [6] Pemko Pekanbaru Targetkan Prevalensi ... [7] The World Health Organization's global target for ... [8] Faktor-faktor yang bergubungan dengan kejadian ... [9] Tantangan Pencegahan Stunting Pada ... [10] Berdampakkah pandemi covid-19 terhadap ... [11] Posyandu application in Indonesia: From health ... [12] Stunting diagnostic and awareness: Impact assessment study of ... [13] Stunting in childhood: An overview of global ... [14] Model Pengendalian Faktor Risiko Stunting ... [15] A review of child stunting determinants ... [16] Determinants of the stunting of children ... [17] The stunting syndrome in developing ... [18] Mother's knowledge of stunting in toddlers ... [19] Mother's nutritional knowledge and ... [20] Implementasi teknologi informasi dan komunikasi ... [21] Sample size determination in health ... [22] Aplikasi Cegah Anak Lahir Stunting Berbasis ... [23] Understanding the role of digital ... [24] Analisis Layanan Website sebagai Media ... [25] Pemanfaatan Website sebagai Media Promosi dan ... [26] Utilization of information and communication technology in an effort ... [27] Communication patterns and media technology ... [28] Contextual Based E-learning (CBE): a new model for online teaching in ... [29] Use of technology for monitoring the development ... [30] Personalized digital health communications to Increase ... [31] Attitudes toward health, healthcare, and ehealth of people ... [32] The utilization of android-based application as a stunting ... [33] Pemakaian Aplikasi Mobile "Balita Sehat" Meningkatkan ... [34] Mobile app-based health promotion programs: a systematic ... [35] Influence of breast milk education media on increasing knowledge about breast milk: Literature ... [36] Penggunaan aplikasi berbasis web pada pengetahuan kader posyandu mengenai deteksi dini ... [37] Can mobile phone apps influence people's health behavior change? An evidence ...

Introduction

Indonesia has three main nutritional problems, namely, stunting, wasting, and obesity [1]. Based on the 2019 Toddler Nutritional Status Survey, the prevalence of stunting among children under five in Indonesia is 27.7%. Meanwhile, the 2018 Global Nutrition Report ranked Indonesia 108th out of 132 countries for stunting prevalence, which is the second-highest level in Southeast Asia (after Cambodia) [2]. Given reducing stunting is a priority for national development, the Indonesian government aims to reduce stunting by 14% by 2024 [3], while Riau Province has targeted an 18% reduction [4].

According to the 2021 Indonesia Nutrition Status Survey, the prevalence of stunting in that province is 22.3%. In the provincial capital, Pekanbaru, the prevalence is 11.4% [5]. The target for reducing stunting prevalence by 2024 is 6.34% [6]. That is, although the stunting prevalence in Pekanbaru has reached the 20% target established by the World Health Organization [7], stunting risk must continue to be prevented. By recognizing the city as an exemplary case for its work against stunting prevalence, Pekanbaru was designated one of 15 stunting loci in 2021 [8].

The COVID-19 pandemic and the associated social restrictions, reduced activity of integrated health centers, and reduced access to health and nutrition services represented major obstacles to reducing stunting [9, 10]. This demanded innovative steps to overcome these issues, such as educating the public about early detection and anticipation of stunting via information system applications. The government has issued several such applications, including e-PPGBM [10, 11]. This stunting application has been widely researched and is available on the Play Store with various menus [12]. However, there is a demand to develop a comprehensive program that meets all the needs and problems related to short stature.

The Stunting Education and Anticipation System is a website developed to help deliver information and education to the public to increase knowledge about stunting, especially during the first 1000 days of life (1000 HPK). The menu on this website, among other things, contains educational material in the form of articles and educational videos on stunting prevention and control at 1,000 HPK. 1000 HPK is the period that starts from pregnancy until the child is two years old. Apart from that, there is a menu for educational games, news about stunting, and a consultation menu for users. In addition, there is data entry for pregnant women, which helps know the nutritional status and anemia status of pregnant women. A toddler's data entry is also helpful for knowing the status of a child's growth and development.

This study's design of educational materials involved using a stunting education model developed based on the theoretical framework of stunting causes from Unicef [13], the stunting risk control model [14], and several studies related to determinants and stunting interventions [15–17]. The stunting risk control model is designed to empower families, especially mothers [14]. Mothers lacking knowledge is among the causes of stunting in toddlers [18, 19]. As primary caregivers, mothers can increase their knowledge of stunting and improve their attitude and practice toward meeting nutritional needs, monitoring child growth and development, and delivering adequate parenting. The development of an information-technology–based education model facilitates the delivery of messages and information to users [20]. Accordingly, this study aimed to evaluate the effectiveness of the Education System and Stunting Anticipation on mothers' knowledge, attitudes, and practices in preventing stunting in Pekanbaru City.

Materials and Methods

Design

This quantitative analytic research used a quasi-experimental pre- and post-test design with controls. The intervention group comprised pregnant women and mothers of toddlers who received exposure to the education system and anticipate stunting. The control group was pregnant women and mothers of toddlers without exposure to the education system and anticipation of stunting. This study was done in April-July 2022.

Participants

Participants were pregnant women and mothers with children under five years (0–59 months). Inclusion criteria were mothers of toddlers and pregnant women willing to participate in the study who owned a smartphone and could be observed via WhatsApp during the one-month study period. Participants in the intervention group were from the area with the highest incidence of stunting in the Rejosari Health Center Work Area. Participants in the control group were from the area with the lowest incidence of stunting, namely, the area managed by the Sapta Taruna Health Center.

Sample size and sampling method

The sample size was calculated using the Lemeshow formula [21]. Adopting $\alpha=0.05$ and $\beta=0.90$ (standard deviation and mean from research by Rianti *et al*. [22] for practices variable), we obtained a sample size of 148 respondents for each group, indicating a total of 296 respondents were required. Sampling involved stratified random sampling according to the relevant health center's schedule until the minimum sample size was met.

Study tools

The presentation of the stunting education and anticipation website was performed at the integrated health center (for the group of toddlers) and the midwife's clinic (for the group of pregnant women). The development of the education system and anticipating stunting was carried out in three stages:

The first stage involved designing the Stunting Education and Anticipation System platform through a website and educational media (i.e., videos and articles). The website also provided videos and articles about stunting, its causes and consequences, and its short-term and long-term impacts. In addition, there were videos and articles on risk factors for stunting in pregnant women, parenting in the first 1,000 days of life, nutrition for pregnant women to prevent stunting, and the benefits of exclusive breastfeeding. Other materials included stimulating the growth and development of children aged 0–6 years, quality complementary foods, and basic immunization for children.

The second stage involved validating the educational media and testing the Stunting Education and Anticipation System platform. The purpose of this stage was to identify the obstacles that users have to overcome to use the platform, and it allows for its improvement and modification. This involved assessments from IT experts, nutrition experts, and health promotion experts. A systematic trial was conducted on a small sample of 15 pregnant women and toddler mothers. The scale used in the assessment was 1 (very poor), 2 (poor), 3 (good), and 4 (excellent). The overall score obtained was 3.67.

The third stage was to test the effectiveness of the stunting education and anticipation system on mothers' knowledge, attitudes, and practices related to stunting. The instrument used was a questionnaire. The questionnaire trial was conducted on 20 mothers of toddlers who visited the integrated health center in the Rejosari Community Health Center working area. The results of the questionnaire trial showed that 13 knowledge questions, 8 attitude questions (Likert scale), and 8 practice questions (Likert scale) were valid. The reliability test obtained the Cronbach alpha value for each variable, namely knowledge, attitude, and practice, respectively, at 0.76, 0.86, and 0.82, so it was declared reliable (Cronbach alpha >0.6).

Intervention procedure

The intervention was conducted during the integrated health services (mothers of toddlers) and midwife (pregnant women) schedules. Before the intervention, researchers coordinated with community health center leaders and staff to implement the intervention. Pre-test data were collected before exposure to the community health center's stunting education and anticipation system.

Table 1) Content of System Education and Anticipation Stunting

Intervention	Media	Output
Anticipation of stunting		
1. Entering data for pregnant women consisting of Hb level data, nutritional status of pregnant women, parity, and Fe tablet consumption	Website	Find out: 1. Nutritional status of pregnant women 2. Weight gain during pregnancy 3. Anemia status
2. Entering data for toddlers, including age, gender, height, weight, and toddler development, every month	Website	Find out: 1. Nutritional status (weight/age and height/age) 2. Developmental status of toddlers
Content education of stunting		
1. An introduction to stunting, risk factors for stunting, and its long-term and short-term impacts	1. Video (Website and YouTube) 2. Flier (Website and Instagram) 3. Article (Website)	Pre and post-test
2. Risk factor of stunting in pregnant women	1. Video (Website and YouTube) 2. Flier (Website and Instagram) 3. Article (Website)	Pre and post-test
3. Breastfeeding exclusive benefit	1. Video (Website and YouTube) 2. Flier (Website and Instagram) 3. Article (Website)	Pre and post-test
4. Parenting in the first 1000 days of life	1. Video (Website and YouTube) 2. Flier (Website and Instagram) 3. Article (Website)	Pre and post-test
5. Quality complementary foods for toddler growth and development	1. Video (Website and YouTube) 2. Flier (Website and Instagram) 3. Article (Website)	Pre and post-test
6. Nutrition for pregnant women to prevent stunting	1. Video (Website and YouTube) 2. Flier (Website and Instagram) 3. Article (Website)	Pre and post-test
7. Basic immunization in toddlers	1. Video (Website and YouTube) 2. Flier (Website and Instagram) 3. Article (Website)	Pre and post-test
8. Stimulating growth and development of toddlers	1. Video (Website and YouTube) 2. Flier (Website and Instagram) 3. Article (Website)	Pre and post-test

Students majoring in health and cadres monitored using the stunting education and anticipation system website through the What Apps Group application, which consisted of pregnant women and mothers under five years. The intervention group received tutorials on how to use the stunting education and anticipation website that was hosted on YouTube and distributed via What Apps Group. After one month,

variables were measured again by distributing a post-test questionnaire (Table 1).

Statistical analysis

This study's data analysis involved univariate and bivariate approaches. The univariate analysis provided an overview of sociodemographic characteristics and an overview of the variables studied. Bivariate analysis was performed using the Wilcoxon test -because the data were not normally distributed- to determine differences in knowledge, attitudes, and practice before and after the intervention. Meanwhile, the Mann-Whitney test was used to determine the difference between the intervention and control groups.

Findings

This research's output was the stunting education and anticipation web, which was validated with good results by IT, health promotion, and nutrition experts. The website was tested during the research phase and evaluated in terms of its effectiveness.

Most participants had an education level of senior high school and were homemakers. Most mothers had two or fewer children, with four or fewer family members. In terms of exposure to information about stunting, most respondents had received information about stunting. There was a significant difference in the level of maternal education between the intervention and control groups (p<0.001). However, for the variables of occupation, maternal age, parity, number of household members, and exposure to information about stunting, there was no significant difference between the intervention and control groups (p>0.05; Table 2).

Table 2) Frequency distribution (percentage) of sociodemographic characteristics of the intervention (n=148) and control (n=148) groups

Characteristic	Control	Intervention	p-value
Mother's education			
No school	0 (0.0)	3 (2.0)	
Elementary school	4 (2.7)	18 (12.2)	
Junior high school	12 (8.1)	26 (17.6)	<0.001
Senior high school	81 (54.7)	70 (47.3)	
College	51 (34.5)	31 (20.9)	
Mother's job			
Housewife	116 (78.4)	126 (85.1)	
Private employees	12 (8.1)	8 (5.4)	
Government employees	5 (3.4)	4 (2.7)	0.559
Entrepreneur	5 (3.4)	5 (3.4)	
Other	10 (6.8)	5 (3.4)	
Mother's age			
< 30 years	77 (52.0)	61 (41.2)	0.062
≥ 30 years	71 (48.0)	87 (58.8)	
Parity			
> 2 children	41 (27.7)	39 (26.4)	0.794
≤ 2 children	107 (72.3)	109 (73.6)	
Number of family members in one house			
> 4 members	43 (29.1)	42 (28.40)	0.898
≤ 4 members	105 (70.9)	106 (71.6)	
Exposure to information about stunting			
Never	35 (23.6)	43 (29.1)	0.291
Ever	113 (76.4)	105 (70.9)	
Sample groups			
Mothers of toddlers (0–23 months)	83 (56.08)	76 (51.35)	
Mothers of toddlers (24–59 months)	30 (20.27)	42 (28.38)	0.279
Pregnant mothers	35 (23.65)	30 (20.27)	

Before the intervention, there was no significant difference in knowledge, attitude, and practice in the intervention and control groups (p>0.05).

In the intervention group, the mean rank of knowledge was 27.47 before the intervention and 71.50 after the intervention. Notably, 117 participants demonstrated higher knowledge scores after the intervention. Statistically, there was a significant difference in knowledge scores before and after the intervention (p<0.001). The mean rank of the intervention group exceeded the mean rank of the control group, meaning that knowledge scores increased more in the intervention group than in the control group (Table 3).

In the intervention group, the mean rank of attitude was 51.39 before the intervention and 61.46 after the intervention. In the intervention group, 95 participants were found to have higher attitude scores after the intervention; meanwhile, in the control group, only 71 people experienced an increase in attitude scores. There was a significant difference in attitude scores before and after the intervention (p<0.001; Table 3).

The mean rank of practice in the intervention group was 30.88 before the intervention and 35.54 after the intervention. After the intervention, 61 participants from the intervention group demonstrated improved practice scores compared to 44 participants from the control group. That is, the practice scores before and after the intervention had a significant difference.

Table 3) Differences in scores before and after the intervention between the intervention and control groups

Variable	Control (n=148)			Intervention (n=148)		
	No.	Mean rank	p-value	No.	Mean rank	p-value
Knowledge						
After < Before	6	30.42		15	27.47	
After > Before	64	35.98	<0.001	117	71.50	<0.001
After = Before	78	-		16	-	
Attitude						
After < Before	0	0.0		23	51.39	
After > Before	71	36.0	<0.001	95	61.46	<0.001
After = Before	77			30		
Practice						
After < Before	5	28.70		8	30.88	
After > Before	44	24.58	<0.001	61	35.54	<0.001
After = Before	99	-		79	-	

Discussion

The results showed that the scores of participants' knowledge, attitudes, and practices from the intervention group were higher than the control group. These findings align with the results of a systematic review that concluded that using websites to provide education can effectively increase knowledge and change attitudes, suggesting that educational interventions using IT can optimize results because they can be readily accepted and reach more people [23].

The stunting education and anticipation website was developed as an alternative means of providing education to the public, especially in urban communities. The website is a collection of pages of multimedia documents containing text, images, sound, animation, and video [24]. The advantage of using the website as an educational medium is that it provides easy access to information, enables users to search for information, and provides features tailored to user needs [25]. In urban areas, internet network access is more stable, presenting fewer obstacles in the implementation of this kind of product compared to rural areas. The COVID-19 pandemic and its associated social restrictions and increasing use of IT for communicating have led people to become accustomed to using IT in everyday life in the form of social media, websites, and video-conference platforms [26, 27]. Effective learning during the COVID-19 pandemic is online learning, which increases participants' knowledge [28].

In this context, digital applications can contribute to health promotion to improve the health status of the community. According to this paper's literature review, using digital applications can change the practice of people who were initially apathetic about health, making them more aware of health information [29–31]. Using digital applications can help entire communities by enabling them to access information anytime and anywhere, making them more flexible and affordable [32].

This particular intervention involved a website that could transmit stunting education in the form of videos and articles, monitor children's growth and development, and consult mothers to increase their knowledge and improve their attitudes and practice around stunting. The videos on the website make it easier for users to understand the material presented so that they are motivated to take action [28]. A study by Amaliah demonstrated how using the "Healthy Toddler" Mobile Application could increase the knowledge and attitudes of mothers about monitoring the growth and development of toddlers [33]. Elsewhere, Rianti *et al.* considered the use of stunting prevention applications and demonstrated significant differences in the knowledge and practice of pregnant women regarding adherence to taking iron tablets [22]. Meanwhile, a systematic review by Lee *et al.* proved that mobile-application-based health interventions can effectively improve health-promoting practices among the general population, including people without the disease in question [34].

A literature review by Novianty *et al.* reported an increase in knowledge produced by the use of educational multimedia, with improved knowledge, attitudes, and perceptions about breastfeeding, and motivating parents to support exclusive breastfeeding programs for their children [35], and research by Irma *et al.* indicated that using website-based applications increased the knowledge of integrated health center cadres about the early detection of stunting [36].

A systematic review by Zhao *et al.* showed that out of 23 articles meeting the inclusion criteria, 17 studies reported a statistically significant effect on the targeted behavior change. The study showed that self-monitoring was the most common technique used to monitor behavior change. Self-monitoring refers to seeing, evaluating, monitoring, and modifying one's behavior [37]. Another study observed that using applications to monitor nutritional status in the first 1000 days of life makes it easier for parents, midwives, and other health workers to monitor the nutritional development of children [29].

The limitation of this study is the limited intervention time of one month. The limited research time has ensured a smooth process of following up with respondents and the respondents' willingness to be monitored by cadres and health workers. The intervention was conducted during integrated health center activities for the toddler group and midwife

clinics for pregnant women so that only visiting mothers received the intervention. Data entry of pregnant women and mothers under five on the website must involve cadres and health workers so that it is not entirely related to the mother's ability to enter data. This data entry hopes to obtain cohort data on pregnant women and children under five so that it can monitor health status early in preventing stunting.

The study's strength is that the sample is adequate for generalization to Pekanbaru City. The intervention was monitored using the website by health cadres and students majoring in health faculty. The availability of educational materials in the form of videos, fliers, and articles, as well as the input of data on pregnant women and toddlers on the Stunting Education and Anticipation System website, is one of the efforts in preventing stunting. In the future, health workers and cadres can use the stunting education and anticipation system to provide education to the community and monitor the nutritional status of pregnant women and toddlers. Further research is needed to improve the stunting education and anticipation system so that the public can access it widely to improve knowledge, attitudes, and practices in stunting prevention.

Implementing a stunting education and prevention system through family assistance activities for stunted toddlers by involving cadres and students in monitoring the growth and development of stunted toddlers is suggested in the subsequent research.

Conclusion
The stunting education and anticipation system is effective in increasing knowledge and improving attitudes and practices about stunting.

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