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# The Effectiveness of Web-Based Audiovisual Media Applications in Monitoring Children's Growth to Prevent Stunting

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## Abstract

**Purpose.** This study explores comparing mothers' knowledge of health education conducted through web-based audiovisual media between the intervention group and the control group who only read books on maternal and child health.

**Design/methodology/approach.** This study employed criteria for the respondents: mothers who have toddlers, both in the control and treatment groups. We collected the data from February 2021 to May 2021. The respondents were asked to fill out a questionnaire (post-test). Meanwhile, for the control group, after the pre-test, the respondents read a book on maternal and child health for 10 minutes, then continued filling out the questionnaire (post-test). We used Wilcoxon in order to answer our research questions and further analyze our data.

**Findings.** Health education through web applications is more effective with statistical values, 60 for pre-test scores and 80 for post-test scores ( $p = 0.000$ ), while the score of education which is only by reading books from the control group, shows the same score for both pre and post-test score, 70 ( $p = 0.960$ ).

**Practical implications.** Health education through web-based applications consisting of videos about the growth and development of toddlers and stunting can increase mothers' knowledge about monitoring the growth and development of toddlers and is expected to prevent stunting.

**Keywords:** Stunting; Web-Based Media; Health Education

**Paper type:** Research paper

## 1. Introduction

The world has already entered the 4.0 era, characterized by digitalization, the increasing use of social media and the need to have a smartphone. Based on the Ministry of Communication and Information data, 167 million (89%) of Indonesia's population use smartphones (Setiakarnawijaya, Safadilla, Rahmadani, Robianto, and Fachrezzy (2021). This condition provides an opportunity to solve several problems, especially regarding the lack of health information. The significant number of smartphone users in Indonesia facilitates the implementation of health education through social media. A prior study by Rahman, Noorbaya,

Haris, and Johan (2020), stated that social media culture in Indonesia could serve as an instructor who can provide trusted education to the community.

The survey on the nutritional status of Indonesian toddlers in 2019 showed that the prevalence of stunting was 27.67%, while the standard from WHO is 20% (Ciptanurani & Chen, 2021). It implies that Indonesia needs to struggle to lower its prevalence of stunting. The national health system is implemented in integrated and public health centers (World Health, 2017). Mothers use various platforms and services to obtain information about stunting. Data shows that 80% of mothers use integrated health service centers, 31.7% use public health centers, and 16.9% use the internet as a source of knowledge related to stunting (West et al., 2018). Mutiarasari et al. (2021) argued that there are six determinants of stunting in Indonesia: maternal height, maternal education, premature birth, the height of newborn, exclusive breastfeeding, and family economic condition. By providing health education to mothers about stunting, it is expected to reduce the incidence of stunting.

Stunting is a chronic nutritional status problem in toddlers, with the diagnosis that the child's height is shorter than normal children. The patients will be more at risk of suffering from degenerative diseases as they grow older and impact the level of intelligence (Perumal, Bassani, & Roth, 2018). Thus, a strategy is needed to help reduce the incidence of stunting through health education to parents, and reforms in health education services to parents are also required so that the education process becomes more effective (De Onis & Branca, 2016). Learning with audiovisual media through web-based applications can make it easier for parents to access information anytime and anywhere via their smartphones (Nguyen, Lin, Rahman, Ou, & Wong, 2020).

This study compares learning outcomes between the intervention group who were given education using web-based audiovisual media applications and the control group without using web-based audiovisual media applications. The central hypothesis is that web-based health education in the intervention group has higher scores than the control group. Our study contributes to current research related to health education, especially regarding the effectiveness of web-based audiovisual compared to Maternal and Child Health (MCH) book to enhance mothers' knowledge about stunting.

## **2. METHOD**

This study employed a pre-test and post-test quasi-experimental design with a control group. The population was from the working area of Harapan Baru Health Center, Samarinda. Health education interventions for mothers are carried out through the web that can be accessed via smartphones. The weblink is given to mothers who have toddlers. We collected the data from February 2021 to May 2021.

### ***Population***

The population in this study was mothers in the work area of Harapan Baru Health Center, Samarinda. We employed the purposive sampling method to determine our respondents in this study. The criteria were mothers with children under five years old registered as visitors to the

community health center. Respondents in this study gave their consent, had a maternal and child health book (MCH), and had a smartphone. The total population is 1344. The sample used as the intervention group is 50 people, and the control group is 50 people.

### ***Intervention***

The intervention group was given an online questionnaire through a google form, consisting of ten questions about toddler growth and stunting. Then, the intervention was continued by providing a web link, "CETING," abbreviated as *Cegah Stunting* (Health, 2020). The website contains videos of toddler growth and development. CETING is an application developed by the Indonesia Ministry of Health and supported by United Nations Children Fund (UNICEF). Furthermore, the respondent filled in the data on the mother's characteristics, including age, education, occupation, address, data regarding their children, including age, sex, weight, height, height compared to the age of toddlers, and nutritional recommendations. After respondents completed the questionnaire, it was continued by watching a video about stunting. This session ended with a post-test by completing the same questionnaire as the pre-test on the google form to see the difference between the pre-test and post-test scores.

### ***Control Group***

The control group at the beginning was given the same questionnaire as the intervention group via a google form. Then the respondents were asked to read the MCH book for 10 minutes, followed by a post-test with the same questionnaire.

### ***Data Collection***

Data were collected from the completed pre and post-test questionnaire for both intervention and control groups. The questionnaire consists of maternal data: initials, age, education, occupation, address, and toddler data consisting of initials, age, weight, height, and nutritional status. In the end, the questionnaire results related to knowledge about toddler growth and stunting would be generated.

### ***Variable***

This study measures the knowledge of mothers before and after learning the educational videos through web-based applications. It was conducted twice, before and after the intervention. The measure of knowledge is indicated by using a percentage (%). In this study, respondents were allowed to watch other videos than videos provided by the researcher. To minimize the bias, the respondents agreed only to watch and listen to the audiovisual of preventing stunting from our link during the study.

### ***Analysis***

Data related to knowledge is calculated for the total score. The results of the pre-test and post-test scores were analyzed using Wilcoxon to measure the effectiveness of health education through audiovisual media with web-based applications by analyzing the differences in knowledge levels before and after treatment. The level of significance set is 0.05.

### 3. RESULTS

In the analysis, all available data is processed, and the information is presented in percentage. The main result is the total score calculated from the results of the knowledge questionnaire about the growth and development of toddlers and stunting through pre-test and post-test.

**Table 1.** Characteristics of mothers who have toddlers in percentage (%)

<b>Characteristics</b>	<b>Category</b>	<b>N</b>	<b>%</b>
<b>Age of mothers in the intervention group</b>	17 - 25 y.o.	9	18
	26 - 35 y.o.	22	44
	36 - 45 y.o.	19	38
<b>Education of mothers in the intervention group</b>	Elementary School	9	18
	Junior High School	8	16
	Senior High School	26	52
	University/College	7	14
<b>Occupation of mothers in the intervention group</b>	Housewives	29	58
	Private employee	17	34
	Seller	3	6
	Farmer	1	2
<b>Occupation of mothers in the control group</b>	Housewives	39	78
	Private employee	9	18
	Seller	1	2
	Government Employee	1	2
<b>Age of mothers in the control group</b>	17 - 25 y.o.	5	10
	26 - 35 y.o.	25	50
	36 - 45 y.o.	20	40
<b>Education of mothers in the control group</b>	Elementary School	4	8
	Junior High School	15	30
	Senior High School	27	54
	University/College	4	8

Based on table 1, the data shows that most of the respondents for both intervention and control groups were 26-35 years old, 44% and 50%, respectively. For educational background, most of the respondents were high school degrees in both intervention and control groups, 52% and 54%, respectively.

**Table 2.** Characteristics of the children under five in percentage (%)

<b>Characteristics</b>	<b>Category</b>	<b>N</b>	<b>%</b>
<b>Age (intervention group)</b>	0 – 1 y.o.	5	10
	1 – 3 y.o.	18	36
	3 – 5 y.o.	27	54
<b>Sex (intervention group)</b>	Male	22	44
	Female	28	56
<b>Age (Control group)</b>	0 – 1 y.o.	8	16
	1 – 3 y.o.	22	44
	3 – 5 y.o.	20	40
<b>Sex (control group)</b>	Male	25	50
	Female	25	50
<b>Nutritional Status (Height/Age) Intervention group</b>	Very stunting	10	20
	Stunting	4	8
	Normal	35	70
	Tall	1	2
<b>Nutritional Status (Height/Age) control group</b>	Very stunting	7	14
	Stunting	3	6
	Normal	37	74
	Tall	3	6

Table 2 shows that most toddlers were 3-5 years old, with 27 children (54%). In comparison, the control group was 1-3 years, with 22 children (44%). In addition, 56% of toddlers were female in the intervention group, while the control group was equal between males and females. Ten

children were categorized as highly stunting for nutritional status in the intervention group (20%). In contrast, the children in the control group who were high stunted were seven (14%).

**Table 3.** The results of the Wilcoxon test analysis of the control group

	N	Median Minimum - maximum	P-value
Knowledge before reading maternal and child health books	50	70(20-100)	0.960
Knowledge after reading maternal and child health books	50	70 (10-100)	

Based on the analysis in the control group, there is no difference in scores between the pre-test and post-test (Table 3), with p-value = 0.960. Thus, it shows no effect of reading MCH books on the mother's level of knowledge.

**Table 4.** The results of the Wilcoxon test analysis of the intervention group

	N	Median Minimum - maximum	P-value
Knowledge before learning from web-based audiovisual application	50	60 (0-90)	0.000
Knowledge after learning from web-based audiovisual application	50	80 (30-100)	

The analysis results in table 4 show differences in the pre-test and post-test scores in the intervention group with a p-value = 0.000. It indicates a significant effect of health education through web-based audiovisual media on the mother's level of knowledge.

#### 4. DISCUSSION

This study shows a significant effect of education with web-based audiovisual media on increasing mothers' knowledge about the growth and development of toddlers and stunting. In



addition, the result of this study confirms a prior study from Moreno-Ger et al. (2010), which revealed that web-based BLS education has a higher total score for practical skills than BLS standalone.

Someone can obtain knowledge after consciously seeing, feeling, and hearing something (Ulfa, Tahir, Mallongi, & Rachmat, 2020). Social media is considered an aptly means for conveying knowledge because it meets the criteria of having images, photos, videos, and sounds transmitted and received well (Laaser & Toloza, 2017). Educational programs through attractive audiovisuals can influence children's motivation and increase physical activity (Güllü & Güllü, 2019). A previous study also revealed that audiovisual media are more exciting and easy to remember than just visuals, so students will be more motivated to learn (Manno, Lively, Manno, Cheng, & Lau, 2018; Moslehpour, 1995). A recent study by Naderer, Binder, Matthes, Spielvogel, and Forrai (2020) confirmed a significant difference in mothers' knowledge between before and after being given counseling about stunting using audiovisual media, the p-value = 0.000.

Audiovisual media has many advantages compared to other media, which are currently widely used in various activities because they present images and sound simultaneously so that the public can more easily understand the process of both education and counseling activities. Study from Nicolaou and Kalliris (2020) revealed that audiovisual media could be repeatedly played via a smartphone so that user understanding becomes even better. Audiovisual media effectively increases people's knowledge, with the score before the intervention is only 5%, which is considered a good category (Gao et al., 2012; Saudi, Nurhaeni, & Hayati, 2020). It is supported by Putri and Rong (2021) that audiovisual methods such as online videos and TV commercials of about 5 - 6 minutes used in health education activities can increase mothers' knowledge of caring for children with stunting and chronic diseases.

The study results showed that the prevalence of very stunting was 14 children (14%), and the prevalence of stunting was 11 children (11%), out of a total sample of 100 children. It implies that stunting is a severe problem for children's health. Health education to parents regarding stunting is one way to prevent stunting because parents are responsible for their children's health. Stunting occurs due to growth disorders from in the womb to the first two years of life. Stunting can cause pathological disorders associated with morbidity and mortality, decreased neurodevelopment and cognitive function, and an increased risk of chronic disease in adulthood (De Onis & Branca, 2016). Stunting is a severe problem with future risks that can threaten human resource development, and stakeholders must take preventive measures (Prendergast & Humphrey, 2014). Educating and empowering women is an essential factor that must be included in policies to reduce stunting in children. In Kenya, a study from M'Kaibi et al. (2017) shows that good education for mothers significantly influences the low stunting rate.

The research results on the characteristics of mothers showed that most of the mothers who became respondents had high school education. This level includes a reasonably good education category. It can help them to understand a material faster than those with lower education. The study revealed that the mother's education level had the most dominant relationship with the incidence of stunting. The government, health institutions, and related parties are advised to

cooperate in implementing policies for the community to get an excellent education to understand how to provide balanced nutritional intake to children. Thus the risk of stunting can decrease and improve public health status (Nshimiyiryo et al., 2019). Several countries have made interventions to reduce the prevalence of stunting in children through the health and nutrition sector (40%) and other sectors (50%), such as maternal education, maternal and infant care, and the reduction of infertility. Reducing the number of stunting children can be done by developing a framework for organizing health and non-health sector interventions to achieve sustainable development goals in 2030 (Yang et al., 2020).

The majority of the respondents' occupations are housewives, who have sufficient time for valuable things such as watching and listening to health videos which are very useful for health information. Research conducted by Pourkhani, Abdipour, Baher, and Moslehpour (2019) states that the behavior of housewives in utilizing their free time is to use social media as a primary activity, switching from the actual world to the virtual world. Thus, this free time can be used positively by making smartphones a medium to convey health education about monitoring growth and development and stunting in toddlers. Vander Wyst et al. (2019) stated that nutrition education through social media affected the knowledge of pregnant women, with the comparison of pre-test results showing a suitable category of 50% and post-test results increasing to 78.6%. Thus, a mother's knowledge is an indirect cause of stunting but impacts the behavior of mothers in providing nutritious food to their children. It is supported by Emamian, Fateh, Gorgani, and Fotouhi (2014), who stated a significant difference in mothers' knowledge of stunting before and after intervention with brainstorming and audiovisual methods.

This research can be considered for education through web-based audiovisual media to the public in the context of delivering health information. Educational status is a significant determinant in predicting the health of mothers and their children (Hjern, Bergström, Kjaer Urhoj, & Nybo Andersen, 2021). A mother's knowledge and education are vital in caring for children. Education is also expected to prevent the problem of nutritional disorders in toddlers, especially stunting. Education through web-based applications using smartphones is one way to make parents' free time more helpful.

## **5. CONCLUSION**

Based on the study results, researchers can conclude that public health education through web-based audiovisual media can effectively increase parents' knowledge about monitoring the growth and development of toddlers. Web-based education using a smartphone is a more interesting audiovisual presentation and can be repeatedly played to make it easier to understand. Researchers believe that health education through web-based audiovisual media to the public, especially parents, can be the right alternative option in preventing stunting.

This study has several limitations. First, we tested our hypotheses by using cross-sectional data. Thus, it prevents us from examining the cause-effect. We suggest that future studies employ a cohort study in order to examine and analyze the causal-effect. In addition, this study suffers from recall and response bias. Recall bias may increase the likelihood that the outputs will report and recall compared to those without the outputs. In order to minimize the recall and repost bias,

future studies should consider other information sources which will affect the participants' knowledge. Furthermore, although we had certain criteria for our respondents, this study did not fully avoid sampling bias. It implies that our respondents did not truly represent the overall cases.

## **CONFLICT OF INTEREST**

There is no conflict of interest in this research

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## **ETHICAL ISSUES**

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## **REFERENCES**

- Ciptanurani, C., & Chen, H. J. (2021). Household structure and concurrent stunting and overweight among young children in Indonesia. *Public Health Nutrition*, 24(9), 2629-2639. doi:10.1017/S1368980021001385
- De Onis, M., & Branca, F. (2016). Childhood stunting: a global perspective. *Maternal & child nutrition*, 12, 12-26.
- Emamian, M. H., Fateh, M., Gorgani, N., & Fotouhi, A. (2014). Mother's education is the most important factor in socio-economic inequality of child stunting in Iran. *Public Health Nutrition*, 17(9), 2010-2015.
- Gao, X., Wu, Y., Zhang, Y., Zhang, N., Tang, J., Qiu, J., . . . Du, Y. (2012). Effectiveness of school-based education on HIV/AIDS knowledge, attitude, and behavior among secondary school students in Wuhan, China.
- Güllü, A., & Güllü, E. (2019). The Effect of Audiovisual Education on Physical Activity Tendencies in Secondary School Children. *International Education Studies*, 12(3), 81-89.
- Health, M. o. (2020). Cegah Stunting. Retrieved from [www.cegahstunting.id/en](http://www.cegahstunting.id/en)
- Hjern, A., Bergström, M., Kjaer Urhoj, S., & Nybo Andersen, A. M. (2021). Early childhood social determinants and family relationships predict parental separation and living arrangements thereafter. *Acta Paediatrica*, 110(1), 247-254.
- Laaser, W., & Toloza, E. A. (2017). The changing role of the educational video in higher distance education. *The International Review of Research in Open and Distributed Learning*, 18(2).
- Manno, F. A. M., Lively, M. B., Manno, S. H. C., Cheng, S. H., & Lau, C. (2018). Health risk communication message comprehension is influenced by image inclusion. *Journal of*

- Moreno-Ger, P., Torrente, J., Bustamante, J., Fernández-Galaz, C., Fernández-Manjón, B., & Comas-Rengifo, M. D. (2010). Application of a low-cost web-based simulation to improve students' practical skills in medical education. *International journal of medical informatics*, 79(6), 459-467.
- Moslehpour, M. (1995). *Metacognition and problem-solving of college students in technology, engineering, mathematics and humanities*: University of Missouri-Columbia.
- Mutiarasari, D., Miranti, M., Fitriana, Y., Pakaya, D., Sari, P., Bohari, B., Hadju, V. (2021). A determinant analysis of stunting prevalence on under 5-year-old children to establish stunting management policy. *Open Access Macedonian Journal of Medical Sciences*, 9, 79-84. doi:10.3889/oamjms.2021.5622
- Naderer, B., Binder, A., Matthes, J., Spielvogel, I., & Forrai, M. J. P. o. (2020). Food as an eye-catcher. An eye-tracking study on Children's attention to healthy and unhealthy food presentations as well as non-edible objects in audiovisual media. *15(3)*, e12591.
- Nguyen, T. H., Lin, K.-H., Rahman, F. F., Ou, J.-P., & Wong, W.-K. (2020). Study of depression, anxiety, and social media addiction among undergraduate students. *Journal of Management Information and Decision Sciences*, 23(4).
- Nicolaou, C., & Kalliris, G. (2020). Audiovisual Media Communications in Adult Education: The case of Cyprus and Greece of Adults as Adult Learners. *European Journal of Investigation in Health, Psychology and Education*, 10(4), 967-994.
- Nshimiyiryo, A., Hedt-Gauthier, B., Mutaganzwa, C., Kirk, C. M., Beck, K., Ndayisaba, A., . . . El-Khatib, Z. (2019). Risk factors for stunting among children under five years: a cross-sectional population-based study in Rwanda using the 2015 Demographic and Health Survey. *BMC public health*, 19(1), 1-10.
- Perumal, N., Bassani, D. G., & Roth, D. E. (2018). Use and misuse of stunting as a measure of child health. *The Journal of nutrition*, 148(3), 311-315.
- Pourkhani, A., Abdipour, K., Baher, B., & Moslehpour, M. (2019). The impact of social media in business growth and performance: A scientometrics analysis. *International Journal of Data and Network Science*, 3(3), 223-244.
- Prendergast, A. J., & Humphrey, J. H. (2014). The stunting syndrome in developing countries. *Paediatrics and international child health*, 34(4), 250-265.
- Putri, A. P., & Rong, J.-R. (2021). Parenting functioning in stunting management: A concept analysis. *Journal of Public Health Research*, 10(2).
- Rahman, F. F., Noorbaya, S., Haris, F., & Johan, H. (2020, 2020). *Health communication model based on character education to improve university student achievement in midwifery*.
- Saudi, L., Nurhaeni, N., & Hayati, H. (2020). The Effectiveness of Health Education using Mobile Phone-based Audiovisual on Knowledge and Attitude among Mother in Treating Toddler with Pneumonia. *International Journal of Nursing and Health Services (IJNHS)*, 3(2), 305-315.
- Setiarnawijaya, Y., Safadilla, E., Rahmadani, E. A., Robianto, A., & Fachrezzy, F. (2021). Android-based physical fitness software guidance. *Journal of Physical Education and Sport*, 21, 2313-2319. doi:10.7752/jpes.2021.s4295
- Ulfa, M., Tahir, A. M., Mallongi, A., & Rachmat, M. (2020). Effect of education media on improvement visual acetate acid inspection at Sudiang community health center. *Enfermeria clinica*, 30, 439-443.

- Vander Wyst, K. B., Vercelli, M. E., O'Brien, K. O., Cooper, E. M., Pressman, E. K., & Whisner, C. M. (2019). A social media intervention to improve nutrition knowledge and behaviors of low income, pregnant adolescents and adult women. *PloS one*, *14*(10), e0223120.
- West, J., Syafiq, A., Crookston, B., Bennett, C., Hasan, M. R., Dearden, K., . . . Torres, S. (2018). Stunting-related knowledge: exploring sources of and factors associated with accessing stunting-related knowledge among mothers in rural Indonesia. *Health*, *10*(09), 1250.
- World Health, O. (2017). *Global targets 2025 to improve maternal, infant and young children nutrition*. Retrieved from
- Yang, B., Huang, X., Liu, Q., Tang, S., Story, M., Chen, Y., & Zhou, M. (2020). Child nutrition trends over the past two decades and challenges for achieving nutrition SDGs and national targets in China. *International journal of environmental research and public health*, *17*(4), 1129.