

# Effectiveness of self-directed online learning in improving stunting knowledge among health workers: a pilot study at the learning center, Faculty of Public Health, Universitas Indonesia

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**Abstract.** Introduction: The level of knowledge about stunting among health workers remains varied. Nowadays, self-directed or asynchronous online learning has become a prominent approach in the learning process. Objective: This study aimed to examine the effectiveness of self-directed online learning in improving health workers' knowledge about stunting. Method: A total of 41 participants from 5 provinces (South Sumatera, West Java, East Nusa Tenggara, Maluku, and South Sulawesi) were purposively selected to enrol in a stunting course at the Learning Center, PDRC, Faculty of Public Health, Universitas Indonesia. The learning materials comprised 15 topics in the form of animated videos and one digital pocketbook. A paired t-test was used to evaluate changes before and after completing the course. Result: The analysis showed a significant improvement in knowledge score ( $p\text{-value} < 0.05$ ), with an average increase of 21 points. However, an individual topic analysis indicated the need for further discussion to enhance participants' understanding. Conclusion: Self-directed online learning effectively improves health workers' knowledge about stunting. Nevertheless, further studies should explore the impact of synchronous sessions in enhancing knowledge retention and comprehension.

## 1 Introduction

Stunting is a significant issue in Indonesia, and its prevention and management are key priorities in the 2020–2024 Medium-Term Development Plan (Rencana Pembangunan Jangka Menengah/RPJMN). Beyond its association with short stature, stunting has been linked to low intelligence [1, 2] and increased a risk of non-communicable diseases in adulthood [3, 4]. A clear understanding of its causes, risk factors, symptoms, prevention, and management is a crucial factor in efforts to reduce stunting. However, according to the Indonesian Health Survey 2023, only 69.4% of the population has accurate knowledge about

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stunting. Regarding causal factors, 46.6% and 27.7% identified inadequate nutrition before and during pregnancy and poor sanitation are associated with stunting, respectively. Furthermore, only 21.8% recognized that stunting increases the risk of non-communicable diseases (NCDs) in adulthood, while 49.4% understood its association with reduced cognitive capacity.

Health workers, including nutritionists, dietitians, medical doctors, and midwives are among trusted sources of health information trusted by the community [5–8]. The Indonesian Health Survey 2023 revealed that about 40% of adolescents and adults rely on health workers for information about stunting. This finding indicates the importance of accurate knowledge about stunting among health workers as critical factors in improving community awareness about stunting. Studies indicate that well-informed health workers can significantly reduce stunting rates by implementing effective community-based interventions, such as promoting breastfeeding, providing appropriate supplementation, and addressing sanitation issues [9]. Regions with high stunting rates, such as Sub-Saharan Africa (32%) and South Asia (30%), demonstrate the urgent need for targeted interventions led by knowledgeable health professionals [10]. However, disparities in the understanding of stunting and its influencing factors persist among health workers.

Before the Covid-19 pandemic, efforts to increase knowledge and understanding of stunting primarily relied on face-to-face or traditional learning methods. However, offline education posed several limitations, particularly in terms of frequency of implementation, participant capacity, and educational intensity. The sporadic implementation of education further contributes to variations and disparities in understanding stunting. These variations and disparities also cause counterproductive effects on existing stunting prevention and control programs in the community.

The Covid-19 pandemic has transformed people's information-seeking behaviour and learning styles. Most people now independently search for information by utilizing information technology such as online news channels, social media, or taking online courses. These changes have generated opportunities to integrate multimedia into education, including the education of healthcare practitioners. One increasingly adopted approach, particularly for health workers, is asynchronous/self-directed online learning [11]. Moreover, facilitated asynchronous online training has been shown to increase participants' knowledge, motivation, and confidence [12, 13].

Therefore, the Faculty of Public Health of Universitas Indonesia collaborates with universities, professional organizations, and the private sector to develop an online learning platform that provides health workers access to materials about stunting and its related factors. The platform combines synchronous and asynchronous methods, with asynchronous/self-directed learning sessions comprise approximately 70% of the content. This design allows participants to engage with the learning process at their own pace and according to their time availability. Self-directed learning is an approach that fosters a lifelong learning mindset [14].

As part of the platform development stage, the utilization test of the developed stunting course was conducted. This study, which is part of the pilot phase, focuses on evaluating asynchronous or self-directed learning sessions. Therefore, this study aims to determine the effect of online self-directed/asynchronous learning on improving health workers' knowledge about stunting.

## **2 Materials and methods**

This study was conducted from July to August 2023, using a pre-post test design to evaluate asynchronous or self-directed learning sessions of the stunting online class developed by the Learning Center Positive Deviance Resource Center, Faculty of Public Health, University of

Indonesia (PDRC FPH UI). The maximum sample size was determined by the maximum number of participants in each synchronous class after completing the asynchronous sessions, which was 50 participants. The selection of provinces was based on regions with existing partnerships with PDRC FPH UI and the need to represent variations in urban and suburban areas. This approach aimed to provide an overview of the variations in participants’ ability in both technical (internet signal) and non-technical aspects (ability and willingness to follow online asynchronous learning). Each District Health Office from five provinces (South Sumatra, West Java, East Nusa Tenggara, South Sulawesi, and Maluku) provided a maximum of ten participants, representing various types of health workers involved in the implementation of stunting programs at district and community level. In addition, participant selection was based on their commitment to the learning timeframe and willingness to participate in the distance learning model. A total of 41 participants from five provinces met the inclusion criteria and were willing to participate.

The variables collected in this study included participant characteristics (age, type of health worker, and educational background) and knowledge scores before and after participating in asynchronous online learning. Data on participants' characteristics and pre-test scores were collected before they began accessing the training materials. Participants were then allowed to access the online learning materials independently for two weeks. The learning materials consisted of 15 topics of animated videos and one digital pocketbook. At the end of the learning period, participants must take a post test. The pre-test and post-test questions included 45 items.

Data on participants' characteristics were analyzed univariately, while knowledge data levels were analyzed using paired t-tests to determine whether there was a significant increase in knowledge scores after participating in asynchronous online learning. This study obtained a certificate of ethical review from The Ethics Committee of The Faculty of Medicine, Universitas Indonesia (KET-927/UN.F1/ETIK/PPM.00.02/2023).

3 Results and discussion

Most participants have a vocational educational background (43.9%). Approximately 36.6% of participants are Nutritionists and 41.5% are between 31-40 years old (Table 1).

Table 1. Participant’s characteristics

Characteristics	n	%
<b>Formal education</b>		
D3 & D4	18	43.9
S1	8	19.5
Profession	8	19.5
S2	7	17.1
<b>Type of health worker</b>		
Nutritionist	15	36.6
Medical doctor	9	22.0
Midwife	11	26.8
Nurse	1	2.4
others	5	12.2
<b>Age (years)</b>		
20 – 30	7	17.1
31 – 40	17	41.5
41 – 50	13	31.7
> 50	4	9.8

**Table 2.** Pre-post test analysis

Variable	Mean ± SD	Min	Max	Mean difference	p-value
Pre-test	66.0 ± 10.9	45	93	-21.26	0.0001*
Post-test	87.2 ± 9.4	64	100		

\*significantly different (p<0.05), analysed using paired t-test.

Analysis of knowledge level between before and after asynchronous learning showed a significant increase in knowledge scores (p-value < 0.05), with an increase of 21 points (table 2). Table 2 also shows that the lowest participant score increased from 45 in the pre-test to 64 in the post-test.

**Table 3.** Detail of pre-test and post-test score

No	Topics	Video duration	Pre-test	Post-Test
		(minutes)	(Mean ± SD)	(Mean ± SD)
1.	Stunting, Stunted & Dwarfism	2:36	83.0 ± 21.2	98.3 ± 10.4
2.	Stunted detection: Body length measurement	14:24	68.3 ± 29.8	92.6 ± 13.9
3.	Stunted detection: Body height measurement	14:00	74.0 ± 35.3	95.9 ± 13.3
4.	Is stunting hereditary/genetic?	4:28	55.2 ± 28.4	69.2 ± 26.3
5.	Why stunting is important?	1:48	35.7 ± 26.2	76.4 ± 28.1
6.	The First 1000 Days of Life: Why is This Period Critical?	3:08	63.4 ± 30.5	82.2 ± 19.7
7.	Mechanism of Occurrence and Critical Period of Fetal Development	3:57	69.1 ± 30.1	87.9 ± 17.7
8.	The First 1000 Days of Life and Baby’s Cognitive Development	2:06	57.3 ± 27.5	85.9 ± 20.1
9.	Stunting in the First 1000 Days Period and the Risk of Non-Communicable Diseases (NCDs) of 3 Generations	2:37	51.2 ± 35.0	87.1 ± 19.4
10.	What Are The Barrier Factors of The First 1000 Days of Life Period: Child Factors?	2:53	95.1 ± 14.0	97.5 ± 8.7
11.	What Are The Barrier Factors of The First 1000 Days of Life Period: Maternal Factors?	2:23	85.3 ± 21.1	97.5 ± 8.7
12.	Anemic, Thin, and Inadequate weight gain during pregnancy: impact on the baby	2:08	78.8 ± 27.6	90.2 ± 18.5
13.	Stunting, Intelligence, and NCDs in Indonesia	3:50	23.5 ± 15.3	62.1 ± 39.9
14.	Additional Challenges to Accelerate Stunting Reduction in The Pandemic Era	2:07	81.3 ± 22.4	93.5 ± 15.2
15.	Stunting Prevention	6:09	72.3 ± 28.7	91.9 ± 14.3

Research by Guo et al. (2013) indicates that videos lasting 6 minutes or less are effective in maintaining student engagement on MOOC platforms [15]. However, other studies suggest that the optimal video length for online courses is between 12 to 20 minutes [16]. In this study, the duration of the learning videos varies by topic, ranging from approximately 2 minutes to 14 minutes, depending on the depth of the content covered for each topic. For instance, the videos on “Stunted Detection: Body Length Measurement” and “Body Height Measurement” have a duration of up to 14 minutes, as they present the steps of measuring

both body length and height. These videos aim to provide guidance on the correct way to measure to detect stunting (table 2).

Based on the average pre-test scores for each learning topic, five topics had average scores below 60, indicating a poor level of knowledge. These topics included: 1) Is Stunting Hereditary/Genetic?; 2) Why Stunting is Important; 3) The First 1000 Days of Life and Baby's Cognitive Development; 4) Stunting in the First 1000 Days and the Risk of Non-Communicable Diseases (NCDs) Across 3 Generations; and 5) Stunting, Intelligence, and NCDs in Indonesia. The post-test results showed an improvement in the average knowledge scores for all five topics, with scores increasing from below 60 to above 80 [17].

The results of this study align with the findings of Wei et al. [13], which stated that facilitated web-based training can increase the knowledge and capacity of health workers. The findings of this study are also reinforced by the findings of Stark et al. [12], Meredith et al. [18], and Zeng & Luo et al. [19]. In general, self-directed/asynchronous online learning can be a solution to improve the knowledge capacity of health workers, as it overcomes distance and cost constraints and offers greater flexibility in terms of time compared to classical/face-to-face offline training models [13].

An interesting finding was obtained from analyzing post-test scores by topic (table 3). Low pre-test scores and relatively lower improvements in the post-test were observed in topic 4, which addresses whether stunting is genetic/hereditary, and in topic 13, which focuses on nutrition, intelligence, and NCD issues in Indonesia. The relatively low score improvement in these topics may be attributed to the ongoing disagreements among experts regarding the causes of stunting and the relationship between stunting, intelligence, and NCDs. Debate continues among experts regarding the contribution of genetic factors to the incidence of stunting [20–22].

The lower improvements in post-test scores for topics still under debate among experts also indicates the need for synchronous sessions with facilitators. The synchronous sessions would help clarify participants' prior knowledge and address information widely spread on social media and the internet, aligning it with the scientific evidence used in learning materials, such as videos and digital pocketbooks. The importance of synchronous sessions to reinforce asynchronous learning has also been noted in the previous studies [12, 18, 19]. However, the availability of appropriate devices and a stable internet connection is crucial for synchronous learning sessions to provide the expected benefits.

## 4 Conclusion

In conclusion, our data indicate that self-directed online learning is effective in disseminating information about stunting to health workers. These findings highlight its potential as an alternative means for health workers to acquire knowledge, especially amidst time constraints and challenges in accessing online learning due to signal issues. However, further research is needed to combine self-directed/asynchronous with synchronous online learning to assess its impact on strengthening the health workers' knowledge of stunting, particularly on topics still widely debated among experts.

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