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# Effectiveness of Educational Intervention and Herbal Medicine Use in Preventing Stunting: A Study Among Family Welfare Cadres in Ababi Village, Bali

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Artikel Penelitian

***Abstract:*** *Stunting remains a public health priority in Indonesia, including in Ababi Village, Karangasem, which has one of the highest stunting prevalence rates in Bali. This study aimed to evaluate the effectiveness of an educational intervention in improving knowledge among family welfare empowerment cadres regarding stunting and the use of herbal medicine for its prevention. A pre-experimental one-group pretest-posttest design was conducted in Ababi Village. The sample consisted of 40 purposively selected cadres who met the inclusion criteria of being active in community health promotion. The research instrument was a validated questionnaire developed based on the World Health Organization's framework and previous literature, which included items on stunting and the use of herbal medicine for its prevention. The intervention included educational sessions and leaflet distribution. Data were analyzed using the Wilcoxon Signed Rank Test and chi-square test. Results showed that most respondents were aged 23–35 years (37.5%), were housewives (80%), had a primary education level (35%), and belonged to families with four to five members (50%). At baseline, 82.5% of participants had good knowledge of stunting, while only 60% demonstrated good knowledge of herbal medicine use. After the intervention, all respondents (100%) showed good knowledge in both areas, with a statistically significant improvement ($p<0.001$). Bivariate analysis indicated that occupation was significantly associated with knowledge of stunting ($p=0.004$), and education level was associated with knowledge of herbal medicine use ($p=0.043$). In conclusion, the educational intervention effectively improved the cadres' knowledge about stunting and the use of herbal medicine for its prevention. This study supports the role of pharmacists and health educators in community-based stunting prevention efforts.*

***Keywords:*** *herbal medicine, leaflet education, stunting prevention*

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**Abstrak:** Stunting masih menjadi prioritas masalah kesehatan masyarakat di Indonesia, termasuk di Desa Ababi, Karangasem, yang memiliki prevalensi stunting tertinggi di Provinsi Bali. Penelitian ini bertujuan untuk mengevaluasi efektivitas intervensi edukatif dalam meningkatkan pengetahuan kader Pemberdayaan dan Kesejahteraan Keluarga (PKK) mengenai stunting dan pemanfaatan *herbal medicine* untuk pencegahannya. Desain penelitian yang digunakan adalah pre-eksperimental dengan pendekatan one-group pretest-posttest. Sampel terdiri dari 40 kader PKK yang dipilih secara *purposive* dan memenuhi kriteria inklusi, yaitu aktif dalam kegiatan kesehatan masyarakat. Hasil menunjukkan bahwa sebagian besar responden berusia 23–35 tahun (37,5%), berstatus ibu rumah tangga (80%), berpendidikan dasar (35%), dan memiliki anggota keluarga sebanyak 4–5 orang (50%). Sebelum intervensi, 82,5% responden memiliki pengetahuan baik mengenai stunting, dan 60% memiliki pengetahuan baik mengenai penggunaan *herbal medicine*. Setelah intervensi, seluruh responden (100%) menunjukkan peningkatan pengetahuan yang signifikan pada kedua aspek ($p<0,001$). Analisis bivariat menunjukkan bahwa terdapat hubungan signifikan antara pekerjaan dengan pengetahuan

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tentang stunting (p=0,004), serta antara tingkat pendidikan dengan pengetahuan tentang penggunaan *herbal medicine* (p=0,043). Kesimpulannya, intervensi edukatif ini efektif dalam meningkatkan pengetahuan kader tentang pencegahan stunting dan pemanfaatan *herbal medicine*. Studi ini mendukung peran apoteker dan tenaga kesehatan dalam pemberdayaan masyarakat untuk mencapai program "Bali Bebas Stunting".

**Kata kunci:** edukasi leaflet, pencegahan stunting, *herbal medicine*

## Introduction

Chronic malnutrition among young children remains a global issue, closely linked to poverty. Motherhood malnutrition can trigger the development of a stunted linear growth uterus, contributing to intrauterine growth restriction and low birth weight. Furthermore, inadequate nutrition during infancy, along with a high burden of infectious illnesses, predict poor infant growth. Linear growth stunting, defined as height for age z score (HAZ) ≥2 SD below the median, is a clear evidence of persistent childhood malnutrition (1).

According to the latest data, 14.4 million children under the age of five in Southeast Asia suffer from stunting (26.4% prevalence). Indonesia has the second highest prevalence of stunting in Southeast Asia, affecting 31% of the 14.4 million children under the age of five. Even if the prevalence of stunting in Indonesia has dropped from 24.4% in 2021 to 21.6% in 2022, if it approaches 20%, the public health risk is categorized as chronic (2). According to the Indonesian Nutritional Status Study, most of the stunting cases in Indonesia occur in children aged three to four years (36 to 47 months), which represents 6.0% of all cases. Stunting has become a major issue in various Indonesian regions, including Bali (3).

Based on the Indonesian Nutritional Status Study conducted by the Ministry of Health in 2022, Bali diminished the prevalence of stunting from 10.9% to 8.0%, presenting the province with the lowest stunting prevalence in Indonesia. The research was carried out in the Karangasem and Ababi Regencies. Abang Regency has the highest prevalence of stunting in Karangasem Regency, at 13.98%. According to data from Abang 1 Health Center, Ababi Village has the highest rate of stunting in the Abang District (17.82%) (2).

The 2018 Basic Health Survey indicated that 24.6% of Indonesians employ herbal medicines. Traditional medical procedures are used by 31.4% of households, with 12.9% having tried them and 55.7% not using them. Traditional healers dominate 98.5% of health practices, while traditional health workers account for only 2.7%. In Bali province, 40.3% of the population uses herbal medicine (3).

Several studies have demonstrated that potential risks caused by stunting are less prosperous educational achievement, increased risk of obesity, higher susceptibility to non-communicable diseases, and an increased risk of degenerative disorders. Consequently, stunting is an indicator of inferior human capital, which in turn affects the achievement of the country's future (1).

Stunting cannot be treated, but it can be prevented. To avoid stunting, the newborns' and children's dietary needs must be considered beginning with the pregnancy. The idea is to reassure pregnant women that they can eat nutritious foods throughout the pregnancy (4). Herbal medicine is a possible approach for preventing stunting. Plants like moringa and spinach are high in minerals like vitamin A, iron, and calcium, which are crucial for children's growth and development. Including these varied plants in the daily menu can help children grow and avoid stunting by ensuring enough nutritional intake (5).

Choosing herbal medicine provides numerous benefits for reducing stunting. Herbal remedies are frequently inexpensive, allowing families with limited resources to obtain essential nourishment. These foods are typically high in

vital nutrients such as vitamins, minerals, and fiber, helping child development. Aside from that, this strategy can assist in encouraging a well-balanced diet and dietary diversity, both of which are key elements in stunting prevention. Herbal medicines typically contain bioactive ingredients that provide added health advantages (6).

Therefore, promoting the use of herbal medicine for stunting prevention is not only a cultural and economic strategy but also a public health urgency to address persistent nutritional gaps in Indonesia. Educational interventions that enhance community understanding of safe and effective herbal use are essential to maximize their potential benefits.

This study offers a framework for understanding how educational interventions can improve community knowledge regarding the use of herbal medicines for stunting prevention. While it does not assess the direct effectiveness of herbal remedies, the findings highlight the importance of promoting accurate information about their role in supporting child nutrition, especially in regions where stunting remains a concern.

## Method and Materials

### *Method*

Pre-experimental study with one group of pre-posttest without control group was conducted in Ababi Village on 40 family welfare empowerment cadres selected purposively. It was chosen to measure the immediate impact of an educational intervention on participants' knowledge before and after treatment. A control group was not included due to ethical and logistical considerations, as withholding beneficial educational information in an area with high stunting prevalence would have been inappropriate. Nevertheless, pre- and post-intervention comparisons using non-parametric tests provided valid evidence of change attributable to the intervention.

Interventions took the form of education and distribution of leaflets. The sample size was determined using the Isaac and Michael formula.

$$S = \frac{\lambda^2.\mathrm{N.P.Q}}{d^2\ (N-1) + \lambda^2.P.Q}$$

### *Materials*

This research used leaflets as intervention material, which provided information on herbal remedies and how to prevent stunting. Researchers developed the leaflet based on previous studies (7). This media has also been registered with Indonesian intellectual property rights No. EC002024189424.

The questionnaire used in this study was developed based on the World Health Organization (WHO) conceptual framework on child stunting, which highlights key determinants such as nutrition, health services, sanitation, and maternal-child factors. Additionally, it was adapted and refined from prior validated instrument (4), ensuring its relevance to the local context and study objectives.

The instrument was structured into three main sections. The first gathered demographic and background information of the respondents, including age, education, occupation, income, and family size. The second section measured knowledge about stunting, consisting of seven (7) questions that explored participants' understanding of its causes, consequences, and preventive strategies. The third section focused on the use of herbal medicine in stunting prevention, with five (5) questions examining familiarity with specific medicinal plants, their nutritional value, and how they are used in daily diets.

Each question used the Guttman scale, with dichotomous responses: Yes/True (scored 1) and No/False (scored 0). The total score for each section was then categorized into levels of knowledge: good, fair, or low. For example, a score of 4-5 in the herbal medicine section was classified as good, while lower scores indicated fair or insufficient knowledge.

Validity testing confirmed that all items had an r-count > 0.30 and p-value < 0.05, indicating that the questions were valid. Reliability analysis using Cronbach's alpha > 0.60 showed that the instrument had acceptable internal consistency. This scoring and classification allowed researchers to measure not only baseline knowledge but also changes following the educational intervention, with comparison done using the Wilcoxon Signed Rank Test.

### *Statistical test*

Data were analyzed using a software platform compatible with SPSS version 24.0, based on an open-source system, and the non-parametric Wilcoxon Signed Rank Test was applied.

### *Ethics*

The International Bali University Ethics Committee Number 02.0399/UNBI/EC/IV/2024 granted this study on April 17th, 2024.

## Results and Discussion

### *Characteristics of Respondents*

A total of 40 family welfare empowerment cadres participated in the research, as presented in **Table 1.**

**Table 1.** Characteristics of Respondents (n=40)

| Category | (n) | (%) |
|---|---|---|
| **Age Groups (years)** | | |
| 23–35 | 15 | **37.5** |
| 36–45 | 12 | 30.0 |
| >45 | 13 | 32.5 |
| **Respondent's Education** | | |
| Elementary | 14 | **35.0** |
| Junior | 12 | 30.0 |
| Senior | 9 | 22.5 |
| Diploma | 3 | 7.5 |
| Bachelor | 2 | 5.0 |
| **Husband's Education** | | |
| Elementary | 8 | 20.0 |
| Junior | 13 | 32.5 |
| Senior | 14 | **35.0** |
| Diploma | 1 | 2.5 |
| Bachelor | 4 | 10.0 |
| **Respondent's Occupation** | | |
| Housewife | 32 | **80.0** |
| Private sector | 5 | 12.5 |
| Others | 3 | 7.5 |
| **Husband's Occupation** | | |
| Private sector | 24 | **60.0** |
| Others | 16 | 40.0 |
| **Total Income of 1 Family** | | |
| < Rp2.000.000 | 30 | **75.0** |
| Rp2.000.001-Rp3.000.000 | 9 | 22.5 |
| >Rp3.000.000 | 1 | 2.5 |
| **Family Members** | | |
| 1-3 person | 12 | 30.0 |
| 4-5 person | 20 | **50.0** |
| >5 person | 8 | 20.0 |
| **Early Initiation** | | |
| Yes | 40 | **100.0** |
| **Breastfeeding Status** | | |
| Exclusive | 40 | **100.0** |
| **Source of Information About Stunting** | | |
| Internet | 7 | 17.5 |
| TV | 8 | 20.0 |
| Health magazine | 4 | 10.0 |
| Social media | 15 | **37.5** |
| Colleague | 6 | 15.0 |
| **Source of Information About Herbal Medicine** | | |
| Internet | 4 | 10.0 |
| TV | 6 | 15.0 |
| Health magazine | 2 | 5.0 |
| Social media | 6 | 15.0 |
| Colleague | 22 | **55.0** |
| **Types of Herbal Medicine Planted** | | |
| Sweet leaf | 3 | 7.5 |
| Moringa | 20 | **50.0** |
| Spinach | 6 | 15.0 |
| Ginger | 3 | 7.5 |
| Not Planting | 8 | 20.0 |

Table 1 shows that most of the respondents were women of reproductive age, housewives with low formal education levels, and came from families with relatively low income. These demographic characteristics are important to note, as they reflect the typical profile of community-based health cadres in rural areas. The low education level may influence baseline knowledge and receptiveness to health interventions, making educational efforts especially crucial. Interestingly, although most respondents had only primary education, they

were actively engaged in early initiation and exclusive breastfeeding, indicating a potential openness to maternal and child health practices. The fact that social media and peer discussions were the primary sources of health information suggests that informal channels are influential in health knowledge dissemination in this village. Moreover, the high rate of moringa cultivation among respondents reflects local familiarity with herbal medicine, which could facilitate its integration into stunting prevention strategies.

### *Knowledge*

**Table 2.** Knowledge of the respondents (n=40)

| | Pretest n (%) | Posttest n (%) | $Z_{score}$ | p |
|---|---|---|---|---|
| Knowledge About Stunting | | | | |
| Good | 33 (82.5) | 40 (100.0) | -5.393 | <0.001 |
| Fair | 7 (17.5) | - | | |
| Knowledge About the Use of Herbal Medicine to Prevent Stunting | | | | |
| Good | 24 60.0 | 40 (100.0) | -4.755 | <0.001 |
| Fair | 15 (37.5) | - | | |
| Low | 1 (2.5) | - | | |

Table 2 shows that before the intervention, 33 (82.5%) respondents had good knowledge about stunting, as did 24 (60%) respondents about using herbal medicine to prevent stunting. After the intervention, all 40 respondents (100%) were significantly in the good category (p<0.001).

This is in line with previous research indicating that stunting detection education may significantly increase mothers' knowledge regarding stunting prevention in children aged 0-24 months (8). Furthermore, other studies indicated that combining herbal medication with daily cooking has a beneficial impact. People started using herbs such as spinach as vegetables and chips to increase nutrition and adjust their diet after receiving training on how to take advantage of herbs to avoid stunting (6).

Research on stunting education using pop-up media yielded similar results, with an improvement in knowledge of more than 80.0% following the intervention. This demonstrates that educational activities regarding the consumption of herbal medicines to prevent stunting improve public understanding (9).

This supports the findings of the present study, where significant gains in knowledge were also observed after an educational intervention using leaflets. Both studies emphasize the importance of accessible and engaging educational tools in improving community understanding of stunting prevention. Although different media were used (pop-up media versus leaflets) the results indicate that when information is delivered in a clear, practical, and culturally relevant format, it can effectively enhance health literacy. The consistency between the two studies highlights the potential for community-based health promotion strategies to be adapted using various low-cost, visual learning tools, especially in rural or underserved areas. This reinforces the core idea of the current study that education about herbal medicine for stunting prevention, when appropriately designed, can be a powerful means to empower local health cadres and influence public behavior.

The nutritional information is obtained from integrated health service centers, which supply nutrition assistance for pregnant women and children. This service not only provides additional dietary meals for pregnant women and children but also educates them on how to select and prepare nutritious meals. Regular education, provided by nutrition officers at community health centers and cadres, is required to avoid stunting effectively.

**Table 3**. Relationship between Knowledge and Characteristics (n=40)

| **Knowledge About Stunting** | |
|---|---|
| Characteristics | Sig. |
| Age Groups (years) | 0.315 |
| Education | 0.340 |
| Occupation | **0.004*** |
| **Knowledge About the Use of Herbal Medicine to Prevent Stunting** | |
| Characteristics | Sig. |
| Age Groups (years) | 0.690 |
| Education | **0.043*** |
| Occupation | 0.815 |

*significance (p<0.05)

Many factors influence knowledge, including age, level of education, occupation, income, experience, information, and social culture. In this study, as shown in Table 3, respondent age did not affect stunting knowledge or the usage of herbal medicine to prevent stunting ($p>0.05$). This differs from the previous study, which stated that age is related to knowledge level (10). The results of this research are in line with previous research, which noted that the respondents' age was not associated with their level of knowledge about stunting and the use of herbal medicine for stunting prevention (11). In today's digital age, access to information is no longer restricted to an age, enabling people of all ages to acquire equivalent levels of knowledge.

The study's findings also reveal that the respondent's education is unassociated to improving knowledge ($p>0.05$). The results of this study differ from previous studies which stated that the higher the respondents' education level could substantially improve mother knowledge (8).

Respondents' education correlates with their knowledge of herbal medicine to prevent stunting ($p=0.043$). The findings of this study are consistent with previous studies, which have found that the higher a respondent's education level, the higher their level of knowledge (12). Various prior research found that higher levels of education predicted better health outcomes (8,13).

This study also found that the respondent's occupation is related to their level of knowledge regarding stunting ($p=0.004$). The findings of this study are consistent with earlier studies in which family welfare empowerment cadres were directly involved in activities linked to family and child welfare, particularly integrated service posts (14). The work environment may assist individuals developed experience and expertise. Respondents might benefit from this experience and skill, particularly in stunting.

The research findings additionally showed that the respondent's deeper knowledge of herbal medicine was not associated with their occupation ($p>0.05$). This aligns with previous studies (11). Another study indicated that working moms' age and education level are associated with stunting in children under the age of two (10).

Information is one of the predictors of increasing individual knowledge. Most respondents' knowledge about stunting is in a suitable category, compared to knowledge about using herbal medicine to prevent stunting. This could be caused by respondents frequently being exposed to information related to stunting rather than information about using herbal medicine to prevent stunting.

Respondents who act as family welfare empowerment cadre often receive counselling about stunting from the Community Health Center or other institutions in Ababi Village, considering that Ababi Village has the most stunting cases in Karangasem Regency. Meanwhile, respondents did not know much about the use of herbal medicine to prevent stunting.

## Conclusion

The educational intervention using herbal-based leaflets significantly improved the knowledge of Family Welfare Cadres in Ababi Village regarding both stunting prevention and the use of herbal medicine ($p < 0.001$). These findings indicate a statistically significant differences in knowledge before and after the intervention. Future studies are recommended to adopt an experimental design with control groups to strengthen causal inferences and evaluate the sustainability of knowledge and behavioral changes over time.

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## Conflict of Interest

The authors declared that there was no conflict of interest in this study.

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