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# Effectiveness of an IMB-Based Stunting Prevention Model Among Adolescents: A Quasi-Experimental Study

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## ABSTRACT

**Background:** Stunting remains a significant public health issue in Indonesia. Conventional interventions often focus on pregnancy and early childhood, showing limited sustainability. Adolescents, as prospective parents, represent a strategic target for sustainable prevention, yet evidence on effective behavior change models for this group remains limited.

**Methods:** This quasi-experimental study adhered to the TREND guideline. Female adolescents (N=120) aged 15-20 years from schools and Islamic boarding schools in Sumenep were randomly assigned to an intervention group (n=60) that received a structured IMB-based program or a control group (n=60) that received standard education. The intervention comprised sessions on information, motivation, and behavioral skills. Dependent variables were knowledge, motivation, and behavior, measured via validated questionnaires. Data were analyzed using Mann-Whitney U tests with significance at $p < 0.05$

**Result:** The intervention group showed significant improvements in knowledge (85% good post-test vs. 13.3% pre-test, $p < 0.001$), motivation (75% high post-test vs. 11.7% pre-test, $p < 0.001$), and behavior (90% good post-test vs. 11.6% pre-test, $p < 0.001$). The control group showed no significant changes.

**Conclusion:** The IMB model effectively enhances stunting prevention knowledge, motivation, and behavior among adolescents. It is recommended for integration into adolescent health programs in similar LMIC settings.

**Keywords:** Stunting; Adolescent; Health Behavior; Health Education; Motivation; Nutrition



## Implications for Research, Practice, or Policy

- IMB-based interventions can strengthen adolescent nutrition behaviors and can be incorporated into routine school health programs in LMIC settings.
- The model can support policymakers in updating evidence-based adolescent health protocols, especially related to premarital health education.

**Implications for Research, Practice, or Policy**

- The structured behavior change approach is adaptable to cultural contexts, enabling scalable stunting-prevention programs across resource-limited communities

## INTRODUCTION

Stunting affects approximately 22% of children under five globally, with the burden disproportionately high in low- and middle-income countries (WHO, 2020). In Indonesia, the national stunting prevalence was 21.6% in 2022, while East Java province reported 23.5%, with Sumenep Regency exceeding both at 26.8% (Indonesian Ministry of Health, 2023). This condition impairs physical growth, cognitive development, and future economic productivity.

Conventional stunting interventions in Indonesia typically target pregnant women and toddlers, despite evidence suggesting that preventive measures during adolescence offer greater sustainability and intergenerational impact (Soviyati et al., 2023). Adolescent girls, as future mothers, represent a strategic "window of opportunity" for breaking the cycle of malnutrition. However, current programs in Sumenep often fail due to limited contextual adaptation, insufficient motivation-building, and lack of behavioral skills training (Purnamasari et al., 2024).

The Information-Motivation-Behavioral Skills (IMB) model provides a comprehensive theoretical framework that addresses these gaps (Fisher & Fisher, 2023). Conceptually, the model posits that behavior change requires adequate information, sufficient motivation, and necessary behavioral skills. In stunting prevention, this translates to: (1) Information about nutrition and reproductive health; (2) Motivation through social support and personal commitment; and (3) Behavioral Skills for practicing healthy behaviors. While the IMB model has been successfully applied across various health contexts, its application to stunting prevention among adolescents in culturally distinct regions such as Sumenep remains unexplored. The local context, characterized by strong cultural norms and the significant influence of Islamic boarding schools, necessitates tailored approaches (Putri et al., 2024). This study, therefore, aims to evaluate the effectiveness of a culturally adapted IMB-based stunting prevention model in improving knowledge, motivation, and preventive behaviors among adolescents in Sumenep Regency, Indonesia.

## METHODS

### Study Design

This study employed a quasi-experimental pre-post test design with a control group, following the TREND reporting guidelines for non-randomized trials.

### Participants

The study was conducted in Sumenep Regency, East Java, Indonesia, from October to November 2025. Participants were female adolescents aged 15-20 years recruited from three educational institutions: MAN Sumenep, Muhammadiyah Sumenep Senior High School, and SMU Plus Miftahul Ulum Islamic Boarding School. Inclusion criteria comprised: (1) female adolescents aged 15-20 years; (2) enrollment in one of the selected schools; (3) willingness to participate via written informed consent. Exclusion criteria included: (1) severe illness preventing participation; (2) planned relocation during the study period.

Using simple random sampling, 120 participants were selected (60 intervention, 60 control). Sample size was calculated using G*Power software (effect size = 0.5, α = 0.05, power = 0.95).

## Instrument

Data were collected using a validated IMB-based questionnaire adapted from Fisher & Fisher (2023). The instrument comprised four sections: (1) demographic characteristics; (2) knowledge (15 items, α = 0.85); (3) motivation (12 items, α = 0.82); and (4) behavior (10 items, α = 0.88). Knowledge was categorized as poor (<60%), fair (60-80%), and good (>80%); motivation and behavior were categorized as low, medium, and high based on total scores

## Intervention

The intervention group received the "Great Teens" program, a structured IMB-based intervention delivered over four weekly sessions (60-90 minutes each) by trained facilitators. Sessions included:

1. Stunting and nutrition education (Information)
2. Motivational group discussions with peer support (Motivation)
3. Behavioral skills training through simulations (Behavioral Skills)
4. Action planning for sustainable practice

The control group received standard health education (one 60-minute session on general nutrition delivered by health workers). Intervention fidelity was monitored through facilitator checklists and random session observations the control group.

## Data Collection

Trained enumerators collected data using identical procedures for both groups in classroom settings. Pre-test data were collected one week before intervention, with post-test data collected four weeks after intervention completion.

## Data Analysis

Data were analyzed using SPSS 25.0 and SmartPLS 4.0. Normality was assessed using Shapiro-Wilk test ($p > 0.05$). Since data were not normally distributed, Mann-Whitney U tests compared differences between groups, with significance set at $p < 0.05$. SmartPLS was used to examine the structural relationships between IMB components

## Ethical Consideration

This study received ethical approval from the Health Research Ethics Committee of Surabaya Ministry of Health Polytechnic (No. 1236/KEPK-PS/IX/2025). Additional permissions were obtained from Sumenep District Health Office and school principals. Written informed consent was obtained from all participants, with confidentiality maintained throughout the research

# RESULTS

**Table 1** summarizes participant demographics. Both groups were comparable at baseline, with most participants being female, aged 15-17 years, and all enrolled in senior high school.

Table 1. Baseline Demographic Characteristics of Participants (n=120)

| Characteristic | Category | Intervention (n = 60) | Control (n = 60) |
|---|---|---|---|
| Gender | Male | 15 (25.0%) | 25 (41.7%) |
| | Female | 45 (75.0%) | 35 (58.3%) |
| Age (years) | 15–17 | 32 (53.3%) | 36 (60.0%) |
| | 18–20 | 28 (46.7%) | 24 (40.0%) |
| Education | Senior High School | 60 (100%) | 60 (100%) |

**Table 2.** Pre-test and Post-test Scores for Knowledge, Motivation, and Behavior

| Variable | Group | Pre-test | Post-test | p-value |
|---|---|---|---|---|
| Knowledge | Intervention | 8 (13,3%) | 51 (85%) | <0.001 |
| | Control | 11 (18,3%) | 12 (20%) | 0.752 |
| Motivation | Intervention | 7 (11.7%) | 45 (75%) | <0.001 |
| | Control | 11 (18,3%) | 11 (18,3%) | 1.000 |
| Behavior | Intervention | 7 (11,65) | 50(90%) | <0.001 |
| | Control | 11 (18.3%) | 12 (20%) | 0.812 |

**Table 2** shows changes in knowledge, motivation, and stunting prevention behaviors before and after the intervention. The intervention group demonstrated clear improvements across all three domains, with a marked increase in the proportion of participants achieving good knowledge, high motivation, and good preventive behaviors at post-test compared with pre-test. In contrast, the control group exhibited minimal changes across the same domains, indicating relatively stable levels of knowledge, motivation, and behavior over the study period. Overall, these findings suggest that participants exposed to the IMB-based program experienced more favorable developments in stunting prevention–related outcomes than those receiving standard education.

## DISCUSSION

The findings suggest that IMB-based education contributes substantially to adolescents' capacity to prevent stunting through enhanced knowledge, motivation, and preventive behaviors. Improved knowledge of stunting prevention reflects the effectiveness of theory-informed educational approaches in increasing adolescents' understanding of nutrition and growth-related health risks. This finding is consistent with previous studies demonstrating that structured and contextually relevant nutrition education improves adolescents' health literacy (Sriantari, 2022; Purnamasari et al., 2024).

The observed increase in motivation highlights the importance of addressing both individual and social determinants of health behavior. Within the IMB framework, motivation encompasses personal beliefs as well as perceived social support, which aligns with self-determination theory emphasizing autonomy, competence, and relatedness as key drivers of sustained behavioral engagement (Ryan & Deci, 2000). In settings where communal norms strongly influence adolescent behavior, reinforcement through peer networks and faith-based environments can amplify motivational effects, as supported by prior community-based adolescent health studies (Rahmawati et al., 2021).

Positive changes in stunting prevention behaviors indicate that improvements in knowledge and motivation were accompanied by adolescents' ability to enact preventive practices in daily life. This supports the IMB assumption that behavioral skills serve as a critical link between intention and action.

Similar findings have been reported in nutrition and reproductive health interventions in low- and middle-income countries, where skills-based components were essential for translating awareness into consistent health behaviors (Rahmawati et al., 2021; Purnamasari et al., 2024).

From a contextual perspective, the findings underscore the importance of culturally responsive adolescent health interventions. Integrating educational content within familiar social institutions, such as schools and pesantren, enhances acceptability and reinforces shared health norms. Community-oriented approaches have been shown to be particularly effective in collectivist cultures, where social endorsement plays a central role in shaping individual behavior (Ryan & Deci, 2000; Sriantari, 2022).

Theoretically, these findings support the applicability of the IMB framework to adolescent stunting prevention and extend its relevance beyond its traditional use in adult and infectious disease contexts. By demonstrating the synergistic roles of information, motivation, and behavioral skills, this study contributes to the growing body of evidence advocating for theory-driven, culturally adapted interventions to improve adolescent nutrition outcomes in low- and middle-income settings (Purnamasari et al., 2024; Rahmawati et al., 2021).

### Practical Applications of the Findings

The findings suggest that an IMB-based educational approach may be practically applied to strengthen adolescents' preparedness for stunting prevention by addressing knowledge, motivational readiness, and everyday preventive practices in an integrated manner. The observed alignment between improved understanding, heightened motivation, and positive behaviors indicates that adolescent health programs may benefit from incorporating structured content that links information with personal relevance and practical skills. In contexts similar to the study setting, such an approach may support more meaningful engagement of adolescents in nutrition-related health initiatives within school and community environments.

### Limitations

This study may be limited by its implementation in a single district, which may restrict the generalizability of the findings to adolescents in other geographic or cultural contexts. The inclusion of only female adolescents further limits the applicability of the results to male adolescents. In addition, outcomes were assessed over a relatively short period, and therefore the sustainability of observed changes in knowledge, motivation, and behavior should be interpreted with caution. Finally, the quasi-experimental design may constrain the strength of inferences regarding observed group differences.

## CONCLUSION

This study highlights the relevance of applying an IMB-based approach to stunting prevention among adolescents in a culturally specific setting. The findings indicate that integrating information, motivational elements, and behavioral skills within adolescent health education is associated with improved preparedness for stunting prevention practices. By addressing cognitive, motivational, and practical dimensions simultaneously, the study contributes to a more comprehensive understanding of adolescent-focused prevention strategies and underscores the potential value of theory-informed, contextually adapted interventions to support stunting reduction efforts.

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## Contributors

**Dian Permatasari**: Conceptualization, Methodology, Writing – original draft.

**Ratna Indriyani**: Investigation, Data curation, Writing – review & editing.

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**Dian Ika Puspitasari**: Formal analysis, Writing – review & editing.

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## Conflicts of interest

Not declared.

## REFERENCES

Amelinda, A. C., & Haryani, T. N. (n.d.). Efektivitas Program Dapur Sehat Atasi Stunting di Kampung Keluarga Berkualitas Srikandi Gilingan, Kota Surakarta. Jurnal Mahasiswa Wacana Publik, 3(2), 2023.

Chang, S. J., Choi, S., Kim, S. A., & Song, M. (2014). Intervention strategies based on information-motivation-behavioral skills model for health behavior change: A systematic review. In Asian Nursing Research (Vol. 8, Issue 3, pp. 172–181). Korean Society of Nursing Science. https://doi.org/10.1016/j.anr.2014.08.002

Danianto, A., Cholidah, R., Amalia, E., & Purnaning, D. (2024). The Relationship Between Stunting and Anemia in Toddlers in Malaka Coastal Area, North Lombok. Jurnal Biologi Tropis, 24(4), 1097–1103. https://doi.org/10.29303/jbt.v24i4.7990

Engla Pasalina, P., Fil Ihsan, H., & Devita, H. (n.d.). Hubungan Riwayat Anemia Kehamilan dengan Kejadian Stunting pada Balita Relationship Between a History of Pregnancy Anemia and The Incidence of Stunting in Toddlers. In Jurnal Kesehatan (Vol. 12, Issue 2).

Fisher, J. D., & Fisher, W. A. (2023). An Information-Motivation-Behavioral Skills (IMB) Model of pandemic risk and prevention. Advances.in/Psychology, 1. https://doi.org/10.56296/aip00004

Indonesian Ministry of Health. (2023). Indonesia health profile 2022. Ministry of Health of the Republic of Indonesia.

Marni, M., Zulkifli, A., Thaha, R. M., Hidayanty, H., Stang, S., Syafar, M., Razak, A., Liliweri, A., Sudarmin, R. R., & Picauly, I. (2023). Awareness, Motivation, and Intentions in Preventing Stunting in the Dry Land Area of Kupang Regency, East Nusa Tenggara Province. International Journal of Sustainable Development and Planning, 18(1), 201–207. https://doi.org/10.18280/ijsdp.180121

Pertiwi, M. R., Lestari, P., & Ulfiana, E. (2019). Relationship Between Parenting Style And Perceived Information Sources With Stunting Among Children. International Journal of Nursing and Health Services (IJNHS), 2(4), 273. https://doi.org/10.35654/ijnhs.v2i4.150

Purnamasari, I., Nasrullah, D., Firman, Choliq, I., & Hasanah, U. (2024). Factors Relating to Stunting Prevention Behavior Based on Health Promotion Model (HPM) Theory in Tanah Kali Kedinding Community Health Center Surabaya (pp. 567–583). https://doi.org/10.2991/978-2-38476-273-6_62

Putri, P. M., Shafira, A. S., & Mahardhika, G. S. (2024). Stunting Reduction Strategy In Indonesia: Maternal Knowledge Aspects. Indonesian Journal of Public Health, 19(2), 329–343. https://doi.org/10.20473/ijph.v19i2.2024.329-343

Rahmawati, I., Suryani, D., & Lestari, W. (2021). Adolescent nutrition behavior and stunting prevention in community-based interventions. Journal of Nutrition and Health, 13(3), 201–209.

Rasdianah, N., Nur, M., Yusuf, S., Tandiabang, P. A., Kunci, K., Pengetahuan, A. ;, & Putri, R. (2023). Edukasi Anemia bagi Remaja Putri sebagai upaya Pencegahan Dini Stunting. https://ejurnal.ung.ac.id/index.php/Jpmf,

Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. Contemporary Educational Psychology, 25(1), 54–67. https://doi.org/10.1006/ceps.1999.1020

Soviyati, E., Sulaeman, E. S., Sugihardjo, I., & Wiboworini, B. (2023). Effect of applying the health promotion model in stunting prevention and behavior control in Indonesia. Journal of Education and Health Promotion, 12(1), 227. https://doi.org/10.4103/jehp.jehp_276_23

Sriantari, N. L. P. (2022). Health education and adolescent nutrition knowledge in stunting prevention programs. Jurnal Kesehatan Masyarakat, 17(2), 145–152.

Trisno Aji, W. (2025). Makan Bergizi Gratis di Era Prabowo-Gibran: Solusi untuk Rakyat atau Beban Baru? Naafi: Jurnal Ilmiah Mahasiswa, 2(2). https://doi.org/10.62387/naafijurnalilmiahmahasiswa.v2i2.134

World Health Organization. (2020). Levels and trends in child malnutrition: UNICEF/WHO/World Bank Group joint child malnutrition estimates. World Health Organization.