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Effect of Health Education on Pregnant Women's Knowledge of Physical Environmental Factors Related to Stunting

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Abstract

Background: Physical environmental conditions, including sanitation, clean water, indoor pollutants, cooking-fuel smoke, and residential conditions, may contribute to infection and nutritional problems associated with stunting. Pregnant women are an important target for preventive education because stunting prevention begins before birth. Purpose: This study aimed to determine the effect of health education on pregnant women's knowledge of physical environmental factors related to stunting. Methods: A quasi-experimental one-group pretest-posttest design was used. One hundred pregnant women were selected by purposive sampling from a population of 134. Participants completed a knowledge questionnaire before a one-hour health education session using a presentation and leaflet, and the posttest was administered seven days later. Data were analyzed using a paired-samples t-test after normality was confirmed. Results: The mean knowledge score increased from 18.39 (SD 3.55; range 10-25) before education to 21.75 (SD 2.54; range 14-25) after education, with a mean increase of 3.36 points. The difference was statistically significant ($p < 0.001$). Conclusion: Health education using presentation and leaflet media was associated with higher knowledge scores among pregnant women regarding physical environmental factors related to stunting. Repeated education may be considered within antenatal health promotion, while controlled studies are needed to strengthen causal evidence.

Keywords: Health education, Knowledge, Physical environment, Pregnancy, Stunting

Introduction

Stunting is a chronic growth problem with consequences that may extend beyond childhood, including impaired physical growth, cognitive development, learning performance, and later health. Nutritional status and repeated infection are central pathways in the development of growth problems, making prevention before and during pregnancy important. [1,2]

Physical environmental conditions are closely related to these pathways. Evidence cited in the thesis highlights the role of water, sanitation, hygiene, and household sanitation in childhood stunting. Inadequate clean-water access, unhealthy latrines, poor hygiene, and other environmental conditions may increase exposure to infection and interfere with nutrient utilization and linear growth. [3-7]

Maternal and household factors also contribute to the context in which stunting develops. Nutritional risk, family conditions, and access to health information may influence preventive practices. Health education is therefore relevant because it can provide structured information and reinforce knowledge that supports healthier decisions. Educational interventions using audiovisual or visual media have been reported to improve knowledge or attitudes in other health-promotion settings. [8-11]

In the study area, preliminary service data showed an ongoing stunting burden and a substantial number of pregnant women who could be reached through antenatal health promotion. The educational content in this study addressed sanitation and clean water, indoor pollution, cooking-fuel smoke, and residential environmental conditions associated with stunting. This study aimed to determine the effect of health education on pregnant women's knowledge of physical environmental factors related to stunting.

Method

Research design

This study used a quasi-experimental one-group pretest-posttest design. Knowledge was measured before the health education intervention and again seven days after the intervention. The overall study period was from 30 September 2022 to 16 January 2023; the pretest and education session were conducted on 9 January 2023 and the posttest on 16 January 2023.

Setting and samples

The study was conducted in a primary health-care catchment area in Banyuresmi District, Garut Regency, West Java, Indonesia. The population comprised 134 pregnant women registered in the service area during October-November 2022. Sample size calculation using the Slovin formula yielded 100 participants, who were recruited through purposive sampling. Inclusion criteria were willingness to participate and provide informed consent and permanent residence in the health-center service area. Pregnant women who refused informed consent or had severe illness were excluded.

Intervention

Participant mobilization was assisted by the coordinating midwife and community health cadres. After receiving an explanation of the study and providing written informed consent, participants completed the pretest questionnaire for approximately 10-15 minutes. The researcher then delivered a one-hour health education session on physical environmental factors related to stunting using an oral presentation and leaflet. The content covered sanitation and clean water, indoor pollution, cooking-fuel smoke, and residential environmental conditions. The posttest questionnaire was administered seven days later. Participants who were absent at the scheduled posttest were visited at home, as reported in the thesis.

Measurement and data collection

Knowledge was measured using a questionnaire developed for the study on physical environmental factors related to stunting. The total score ranged from 0 to 25. Before the main study, validity and reliability testing was performed among 30 pregnant women in another health-center service area. Item validity was assessed using Pearson product-moment correlation; all items had correlation coefficients greater than the r-table value of 0.361. Reliability testing produced a Cronbach's alpha of 0.764 and a split-half coefficient of 0.853. These results were reported as adequate for use in the main study.

Data analysis

Data were processed and analyzed using SPSS version 21. Descriptive analysis summarized mean, standard deviation, minimum, and maximum knowledge scores. Normality was assessed using the Kolmogorov-Smirnov test because the sample size exceeded 50. The pretest and posttest distributions were reported as normal ($p = 0.122$

and p = 0.071, respectively), so a paired-samples t-test was used to compare knowledge scores. Statistical significance was set at p <= 0.05.

Results

All 100 participants were included in the reported pretest and posttest analyses. Mean knowledge scores increased after the health education intervention. Before education, the mean score was 18.39 (SD 3.55) with a range of 10-25. Seven days after education, the mean score was 21.75 (SD 2.54) with a range of 14-25.

Table 1

Knowledge scores before and seven days after health education

Measurement	n	Mean	SD	Minimum	Maximum
Pretest	100	18.39	3.55	10	25
Posttest	100	21.75	2.54	14	25

The mean increase in knowledge score was 3.36 points. The paired-samples t-test showed a statistically significant difference between pretest and posttest knowledge scores (reported p = 0.000 in the thesis; presented here as p < 0.001). These findings indicate that higher knowledge scores were observed after the health education session.

Discussion

The main finding was an increase in pregnant women's knowledge scores seven days after health education using a presentation and leaflet. The interval between the education session and posttest is important because the posttest did not measure only immediate recall. The use of spoken explanation together with printed visual material may have reinforced the information and made key messages available for repeated review. Studies cited in the thesis also show that structured health education can improve knowledge or attitudes in other health-promotion contexts, although the populations and topics were different. [10,11]

The content of the education was clinically and public-health relevant because environmental sanitation is linked to infection and child growth. Research cited in the thesis identifies water, sanitation, and hygiene as important correlates of stunting, while unhealthy latrine conditions and inadequate clean-water access can increase exposure to infection. Improving maternal understanding of these pathways may therefore support prevention-oriented decisions during pregnancy and early child care. [3-7]

The intervention also addressed the broader physical environment rather than

nutrition alone. This is consistent with evidence that stunting is multifactorial and can reflect the interaction of nutritional risk, infection, household conditions, and access to preventive services. Studies on malnutrition and stunting cited in the thesis likewise emphasize that family and health-related factors operate together rather than independently. [8,9]

From a service perspective, a one-hour health education session supported by a leaflet may be feasible to integrate into antenatal health-promotion activities. However, the outcome measured in this study was knowledge. The observed increase should not be interpreted as evidence that the intervention changed environmental practices or reduced stunting incidence. Further studies should include behavioral and environmental outcomes and use a comparison group to strengthen evaluation of effectiveness.

Limitation

The thesis reported a logistical limitation during the posttest: some pregnant women did not attend the scheduled session, requiring the researcher to conduct door-to-door visits. In addition, the one-group pretest-posttest design did not include a control group, purposive sampling was used, and the study was conducted in a single primary-care setting. These design features should be considered when interpreting causal attribution and generalizability.

Conclusion

Health education using presentation and leaflet media was associated with higher knowledge scores among pregnant women regarding physical environmental factors related to stunting. The mean knowledge score increased from 18.39 before education to 21.75 seven days after education, with a mean increase of 3.36 points and a statistically significant paired difference ($p < 0.001$). This approach may be considered as a practical component of antenatal health promotion. Future controlled studies should evaluate whether improved knowledge is followed by sustained behavioral and environmental changes.

Ethical Considerations

The thesis reports that participants were informed about the purpose and benefits of the study, participation was voluntary, written informed consent was obtained,

participants' decisions were respected without coercion, and collected data were kept confidential and used only for research purposes.

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Conflict of Interest

The authors declare that there is no conflict of interest related to this study or manuscript.

Author Contribution

Helmida Astriawati Fauziyah - conceptualization, investigation, data collection, formal analysis, and manuscript drafting; Yulia Herliani - supervision, methodological guidance, review, and editing. All authors should review and approve the final statement.

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