

# 論文内容要旨

Effects of school nurse-led health education to reduce malnutrition among primary school children in Bangladesh: cluster non-randomized controlled trial

(バングラデシュにおける小学校児童の栄養不良を低減するための学校看護師主導の健康教育の効果 :

クラスター非無作為化比較試験)

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Malnutrition is a major health concern among children, and there are limited studies on school health in Bangladesh. This study experimentally placed the school nurses in school settings to reduce malnutrition by providing evidence-based health education and increasing awareness and knowledge among primary school children in Bangladesh.

## **Introduction**

Malnutrition affects children's growth and development and leads to death. In Bangladesh, malnutrition rate is high among 5-12 years children due to low case detection, limited health education, poor health assessment, and access to primary care providers. Nonetheless, there is no health checkup system in the schools for the children. Therefore, this study aimed to reduce malnutrition by increasing awareness and knowledge through school nurse-led health education among primary school children in Bangladesh.

This trial followed the CONSORT guideline. Trial registration number: NCT05012592.

**Study Outline:** School nurses are the most important determinant, and the fundamental element is outcome. The researcher developed the evidence-based health education "Health Awareness Program for Primary School Children" (HAPSC) and formed an educational intervention to experimentally place the trained school nurses in the school area in Bangladesh. The school nurses collaborated with the school authorities, children including their parents, and community health workers (CHWs). Subsequently, the school nurses provided HAPSC to school children including their parents. Therefore, the researcher hypothesized that school nurse placement and HAPSC would significantly increase health awareness and knowledge among primary school children to prevent malnutrition.

## **Methods**

A prospective, open-label, parallel-group (1:1), cluster non-randomized controlled trial with a pre-and post-test design was conducted among primary school children between September 2021 and September 2022 in rural Bangladesh. Four government primary schools were selected and assigned to the intervention and control groups. The health checkups -height, weight and body mass index (BMI) and questionnaire data were collected at baseline, midline (5<sup>th</sup> months), and endline (12<sup>th</sup> months). Overall, 604 children were enrolled at the baseline; among them, 455 (control group (CG), n = 220; intervention group (IG), n = 235) completed the study. The children from the IG received HAPSC through the trained school nurses at school. The primary outcome of this study was the change in malnutrition rate which was measured by WHO-2007 BMI-for-age growth reference z-scores tables for 5-19 years children. The secondary outcomes were changes in awareness and knowledge of malnutrition and changes in eating and drinking-related behavior which as evaluated by

researcher-developed pretested questionnaires (Cronbach's alpha was 0.861). A per-protocol set analysis was conducted to explore this study's efficacy. To observe the changes between both groups, covariance was analyzed, and chi-square and Wilcoxon rank-sum tests were performed to compare the distribution between groups. To assess the changes in BMI between the groups a multivariate analysis was performed.

## **Results**

The sociodemographic status of the children was mostly similar in both groups. The changes in the malnutrition rate were not significant at the endline ( $p = 0.225$ ). Whereas, after adjusting the endline data with baseline and sociodemographic data, the children's BMI was improved significantly between the groups ( $p < 0.05$ ). Thus, the child's BMI at the endline was affected by the father's higher educational qualifications ( $p = 0.027$ ). However, the children's raw data of weight, height, and BMI were increased slowly at each time point. Changes in eating behavior, and awareness and knowledge of malnutrition were significantly improved in the IG compared with the CG ( $p < 0.001$ ).

## **Discussion**

The results revealed that the school nurse placement at school had statistically positive effects on the IG at each time point. Although the children's BMI was not significantly changed according to the WHO standard reference between the groups, the children's raw height, weight and BMI steadily increased at each time point. The school nurse-led health education reduced child malnutrition and improved their awareness and knowledge regarding malnutrition in the IG. The collaboration with school authorities, the child's parents, and CHWs created a productive approach to ensuring progressive changes in the children's nutritional status, awareness and knowledge. Therefore, this study result pointed to the significance of the school nurse placement and regular health checkups including BMI monitoring for the children. Whereas, sustainably reducing child malnutrition is still challenging due to poor socioeconomic status in developing countries such as Bangladesh.

## **Conclusion**

This study exposed the significance of school nurses in reducing malnutrition and improved the awareness and knowledge of malnutrition among primary school children in the school area, which may decrease future morbidity and mortality rates in children.