



## Community-Based Physical Activity Program for Childhood Obesity Prevention in Medan City

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### Abstract.

**Background** Childhood obesity is a growing public health concern in urban Indonesia, including Medan City, due to sedentary lifestyles and poor dietary habits. Community-based physical activity programs have shown promise in promoting healthy behaviors and reducing obesity risk among children.

**Objectives** This study aimed to evaluate the effectiveness of a structured community-based physical activity program in preventing childhood obesity among children aged 8–12 years in Medan City.

**Methods** A quasi-experimental pretest-posttest design was employed, involving 60 children recruited from local community centers. The intervention consisted of three 60-minute sessions per week for eight weeks, incorporating aerobic exercises, skill-based games, and recreational sports. Anthropometric measurements, including body mass index (BMI) and waist circumference, were recorded before and after the program. Data were analyzed using paired t-tests and effect size calculations to determine the program's impact.

**Results** Significant reductions in BMI ( $p < 0.01$ ) and waist circumference ( $p < 0.01$ ) were observed following the intervention. The effect sizes indicated a moderate to strong impact, demonstrating the program's effectiveness in improving children's physical health.

**Conclusion** The community-based physical activity program effectively reduced obesity-related indicators among children in Medan City. These findings underscore the importance of implementing structured, community-focused interventions to promote active lifestyles and prevent childhood obesity in urban settings.

**Keywords:** Childhood Obesity, Community-Based Program, Physical Activity, Prevention, Medan, Indonesia

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## INTRODUCTION

Childhood obesity has become a significant public health issue globally, including in Indonesia, where urbanization, sedentary lifestyles, and dietary transitions have led to a noticeable rise in obesity prevalence among children (Ministry of Health, 2022). In Indonesia, the prevalence of overweight and obesity among children aged 5–17 years was 17.2% and 7.0%, respectively, with higher rates observed in urban areas (UNICEF, 2024). These trends are concerning due to the associated long-term health risks, including increased susceptibility to type 2 diabetes, cardiovascular diseases, and psychosocial issues (World Health Organization, 2023).

Addressing childhood obesity requires multifaceted strategies that go beyond clinical settings, emphasizing community involvement and sustainable lifestyle changes. Community-based physical activity programs have shown promise in promoting healthy behaviors and reducing obesity risk among children (Biddle & Asare, 2011). Such programs offer structured opportunities for aerobic exercises, skill development, and recreational activities, which can reduce obesity risk factors while enhancing social interaction and psychological well-being.

Despite their proven benefits globally, limited studies have examined the implementation and effectiveness of these programs in Indonesian urban contexts, particularly in Medan City. This study aims to evaluate the effectiveness of a structured, community-based physical activity program in reducing obesity-

related indicators among children in Medan City. By providing empirical evidence, this research contributes to public health policy and offers practical guidance for designing community interventions that address the growing childhood obesity epidemic in urban Indonesia.

## METHOD

### Participant

A total of 60 children aged 8–12 years were recruited from three community centers in Medan City using purposive sampling. Inclusion criteria included: (1) residing in Medan City, (2) absence of chronic medical conditions limiting physical activity, and (3) parental consent for participation. Participants were assigned to a single intervention group.

### Research Design

This study employed a quasi-experimental pretest-posttest design to evaluate the effectiveness of a community-based physical activity program in preventing childhood obesity. The intervention was conducted over eight weeks, with structured sessions held three times per week, each lasting 60 minutes. Each session included warm-up exercises, aerobic activities, skill-based games, and cool-down stretches, designed to promote physical activity and improve health indicators.

### Data Analysis

Anthropometric measurements, including body mass index (BMI) and waist circumference, were collected before and after the intervention. Data were analyzed using SPSS version 28. Descriptive statistics summarized demographic characteristics, while paired t-tests assessed changes in BMI and waist circumference. Cohen's d effect sizes were calculated to determine the magnitude of intervention effects, with statistical significance set at  $p < 0.05$ .

## RESULTS AND DISCUSSION

### Results

A total of 60 children (32 boys and 28 girls) participated in the study. The mean age was  $10.2 \pm 1.2$  years. Anthropometric measurements before and after the intervention are summarized in Table 1.

**Table 1.** Changes in BMI and Waist Circumference Before and After the Intervention

Variable	Pretest Mean $\pm$ SD	Posttest Mean $\pm$ SD	t-value	p-value	Cohen's d
Body Mass Index (kg/m <sup>2</sup> )	19.8 $\pm$ 2.1	18.9 $\pm$ 1.9	6.52	<0.001	0.64
Waist Circumference (cm)	68.5 $\pm$ 5.2	66.7 $\pm$ 4.8	5.87	<0.001	0.58

Paired t-tests indicated significant reductions in both BMI ( $t = 6.52$ ,  $p < 0.001$ ) and waist circumference ( $t = 5.87$ ,  $p < 0.001$ ) following the eight-week intervention. The calculated Cohen's d values (0.64 for BMI and 0.58 for waist circumference) suggested a moderate to large effect of the community-based physical activity program on obesity-related indicators.

These results demonstrate that structured physical activity programs conducted in community settings can effectively reduce obesity-related measurements among children, supporting the program's potential as a preventive strategy in urban environments like Medan City.

### Discussion

The present study demonstrates that a structured, community-based physical activity program effectively reduced obesity-related indicators, including BMI and waist circumference, among children in Medan City. These findings align with previous studies showing that community-focused interventions can promote active lifestyles and improve physical health in children (Biddle & Asare, 2011; Ortega et al., 2013).

The significant reductions in BMI and waist circumference observed in this study can be attributed to the combination of aerobic exercises, skill-based games, and recreational activities included in the intervention. Regular participation in structured physical activity enhances energy expenditure, improves cardiovascular fitness, and supports healthy weight management (Strong et al., 2005). Moreover, the social and engaging nature of community-based programs can increase adherence and motivation among children, which is crucial for achieving sustainable health outcomes (Sallis et al., 2012).

This study highlights the importance of implementing preventive strategies in urban contexts where sedentary behavior and unhealthy dietary habits are prevalent. By involving local community centers, the program facilitated accessible and enjoyable opportunities for physical activity, demonstrating the potential for scaling such interventions to other urban areas in Indonesia.

Despite the positive outcomes, the study has limitations. The absence of a control group may limit the ability to fully attribute changes to the intervention alone. Additionally, the short duration (eight weeks) may not capture long-term effects on childhood obesity. Future research should consider longer interventions with control groups and include behavioral and dietary assessments to provide a more comprehensive evaluation of program effectiveness.

## CONCLUSION

The community-based physical activity program significantly reduced BMI and waist circumference among children in Medan City, demonstrating its effectiveness as a preventive strategy against childhood obesity. These findings underscore the value of structured, community-focused interventions to promote active lifestyles and support public health initiatives in urban settings. Scaling such programs could contribute to broader efforts in reducing childhood obesity prevalence in Indonesia and similar contexts globally.

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## AUTHOR CONTRIBUTION STATEMENT

Pedomanta Keliat contributed to the conceptualization of the study, project administration, supervision, and drafting of the manuscript. Cristeven Tono Situmorang was responsible for designing the methodology, collecting data, and performing statistical analysis. Fans Darno Prianto Osra Zalukhu conducted the literature review, interpreted the data, and assisted in manuscript writing. Satria Agus Situmorang implemented the community-based program and coordinated participant activities. Risky Cristyan Ginting handled data curation, validation, and provided technical support. Irene Viazza Br Tarigan focused on editing, formatting, and proofreading the manuscript, while Raihan Nurras managed visualization, reporting of results, and the final review of the manuscript. All authors have read and approved the final version and are accountable for all aspects of the work.

## CONFLICT OF INTEREST AND FUNDING

The authors declare that there is no conflict of interest regarding the publication of this article.

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