Healthy Tadulako Journal (Jurnal Kesehatan Tadulako)
Vol. 12 No. 3, July 2026
P-ISSN : 2407-8441/e-ISSN : 2502-0749

Original Research Paper

Nutritional Status Before and After Routine Deworming Medication Intake Among Children Aged 6–12 Years in the Working Area of Karuwisi Public Health Center

Nur Agustini Halim[1], Nurfachanti Fattah[2*], Andi Husni Esa Darussalam[3], Asrini Safitri[4], Nur Fadhillah Khalid[5]

1Medical Study Program, Faculty of Medicine, Universitas Muslim Indonesia
2Department of Parasitology, Faculty of Medicine, Universitas Muslim Indonesia
3Department of Pediatrics, Faculty of Medicine, Universitas Muslim Indonesia
4Department of Clinical Nutrition, Faculty of Medicine, Universitas Muslim Indonesia
5Department of Pharmacology, Faculty of Medicine, Universitas Muslim Indonesia

Email Corresponding:
nurfachanti.fattah@umi.ac.id

Access this article online
Quick Response Code :

DOI : 10.22487/htj.v12i3.2184

Page : 560-568

Article History:
Received: 2026-01-12
Revised: 2026-06-10
Accepted: 2026-07-31

Published by:
Tadulako University, Managed by Faculty of Medicine.

Website :
https://jurnal.fk.untad.ac.id/index.php/htj/index

Abstract

Background: Soil transmitted helminth infections remain relevant to child health and nutrition in Indonesia, and local evidence supports continued attention to hygiene, deworming, and nutritional assessment. **Objective:** This study aimed to describe nutritional status before and after routine deworming among children aged 6–12 years in the Karuwisi Public Health Center working area and to assess concordance between the two recorded nutritional status classifications. **Methods:** This observational analysis included 67 students from SD Inpres Karuwisi I who routinely received deworming medication twice per year. Nutritional status was classified using sex and age specific BMI percentiles from the 2000 CDC reference. Proportions with 95% confidence intervals were reported. Spearman Rho assessed ordinal concordance between the recorded before and after categories and was not interpreted as a treatment effect. **Results:** Normal nutritional status increased descriptively from 43.3% to 65.7%, while underweight decreased from 40.3% to 16.4%. The recorded classifications were strongly correlated ($\rho = 0.771$; $p < 0.001$). **Conclusion:** The post deworming distribution was more favorable among routine users, but causality cannot be inferred because there was no non routine comparison group, parasitological confirmation, or adjustment for major nutritional confounders.

Keywords: Helminthiasis; Deworming Medication; Nutritional Status; School Age Children; Albendazole.

Introduction

Soil transmitted helminth infections remain an important public health problem because chronic intestinal infection can affect health, nutritional status, school participation, and child development. The burden remains concentrated in tropical and subtropical settings where sanitation and hygiene conditions allow continued transmission[1].

In Makassar, local evidence confirms that soil transmitted helminths remain epidemiologically relevant. Detection studies have documented infection in vulnerable urban populations[2], and research conducted among school children in the Karuwisi Health Centre area has shown that personal hygiene practices are associated with soil transmitted helminth infection[3]. These findings support continued attention to prevention among school age children in the same local context.

Helminth infection may coexist with nutritional problems in school children. Studies in Indonesian school settings have reported

associations between soil transmitted helminth infection and nutritional status[4], including evidence involving *Ascaris lumbricoides*[5]. Other school based research has similarly identified a relationship between helminthiasis and nutritional status[6]. These studies establish biological and epidemiological relevance, but they do not imply that deworming alone determines nutritional status.

From an Islamic perspective, cleanliness and purification have an important place in daily life and health related behavior. This cultural value is compatible with practical prevention measures such as hand hygiene, safe food handling, clean water use, footwear, and environmental sanitation. The principle also provides a locally meaningful context for health education related to helminth prevention.

Periodic deworming is one component of helminth control. World Health Organization guidance supports preventive treatment for at risk child populations in endemic areas, commonly using single dose albendazole 400 mg or mebendazole 500 mg according to local epidemiology[1]. Deworming should be implemented together with hygiene, sanitation, nutrition, and health education rather than interpreted as an isolated nutritional intervention.

Program effectiveness also depends on caregiver knowledge, treatment adherence, and appropriate nonpharmacological prevention. Indonesian evidence shows that parental knowledge is related to compliance with deworming administration[7], while systematic review evidence emphasizes the importance of environmental and behavioral measures alongside albendazole treatment[8].

Objective parasitological confirmation is important when a study intends to make claims about active helminth infection or parasite clearance. A previously published Healthy Tadulako Journal study demonstrated the use of stool specimens to identify helminth eggs in children[9]. The present study did not include stool examination; therefore, its findings are interpreted in terms of recorded deworming history and nutritional status rather than confirmed changes in parasite burden.

The working area of Karuwisi Public Health Center, Panakkukang District, Makassar City, routinely implements deworming activities through collaboration between primary health care services and schools. This study therefore aimed to describe nutritional status before and after routine deworming among children aged 6–12 years at SD Inpres Karuwisi I and to assess the ordinal concordance between the two recorded nutritional status classifications.

Materials and Methods

Study Design

This study used an observational analytic approach based on two recorded nutritional status classifications, labelled before and after routine deworming, among eligible school children. The analysis was not treated as a cross sectional comparison between routine and non routine users because all children included in the final analysis had routine deworming history. It was also not interpreted as a controlled intervention study because no untreated comparison group was available and the exact interval and provenance of the earlier anthropometric record were not sufficiently documented in the available study records.

Sample

The source population consisted of children aged 6–12 years attending SD Inpres Karuwisi I in the working area of Karuwisi Public Health Center, Panakkukang District, Makassar City. Participants were selected according to the eligibility criteria established for the original field study.

A total of 76 children were initially assessed. Nine children who did not routinely receive deworming medication were excluded according to the original eligibility criteria, leaving 67 children for analysis. Inclusion criteria were age 6–12 years, routine deworming medication intake twice per year, and parent or guardian consent. Children with a history of allergy or adverse reaction to deworming medication were excluded. Because all 67 analyzed children were routine users, routine deworming had no between person exposure variation and was not modeled as an independent predictor of nutritional status. Consequently, the analysis focused on describing nutritional status and examining other measured characteristics that showed variability within the study population..

Data Collection Technique

Data were collected through interviews with parents or guardians and anthropometric assessment. Body weight was measured in kilograms and height in centimeters, and body mass index was calculated as weight divided by height squared. The original nutritional categories were derived from the 2000 CDC growth reference[10]. BMI for age percentiles were interpreted by sex and age as underweight below the 5th percentile, normal from the 5th percentile to below the 85th percentile, overweight from the 85th percentile to below the 95th percentile, and obesity at or above the 95th percentile[11]. The CDC reference was retained because it had been used for the original classification. The WHO 2007 growth reference is an internationally applicable alternative for children and adolescents aged 5–19 years and should be considered in future prospective work[12].

Data Analysis Technique

Categorical data were summarized as frequencies and percentages. For the four nutritional status categories before and after routine deworming, 95% confidence intervals for proportions were calculated using the Wilson method. Because the final sample contained only routine users, no association estimate comparing routine with non routine deworming was calculated. Spearman Rho was retained only to quantify ordinal concordance between the recorded nutritional status categories before and after deworming, with categories ordered by increasing BMI category as underweight, normal, overweight, and obesity. The correlation was not used as a test of treatment effect or categorical change. Values below 0.001 were reported as $p < 0.001$. A marginal homogeneity analysis of individual category transitions could not be reconstructed from the aggregated transition information available for this revision, so before and after changes are interpreted descriptively.

Ethical Consideration

The study was approved by the Research Ethics Committee of Universitas Muslim Indonesia. The ethical approval was valid until July 12, 2025, with reference number 285/A.1/KEP-UMI/VII/2024. Parent or guardian consent was obtained according to the procedures of the original study.

Results

The study was conducted at SD Inpres Karuwisi I in the working area of Karuwisi Public Health Center, Panakkukang District, Makassar City, in 2025. Of 76 children initially assessed, 9 were excluded because they did not meet the routine deworming criterion. The final analysis therefore included 67 children.

Table 1. Sample Characteristics by Age and Sex

Characteristic	Frequency (n)	Percentage (%)
Age (years)		
9	13	19.4
10	22	32.8
11	22	32.8
12	10	14.9

Characteristic	Frequency (n)	Percentage (%)
Sex		
Male	31	46.3
Female	36	53.7
Total	**67**	**100**

Source: Primary Data, 2025

Table 1 shows that most participants were aged 10 or 11 years, with 22 children in each age group (32.8%). Thirteen children were aged 9 years (19.4%) and 10 were aged 12 years (14.9%). Girls accounted for 36 participants (53.7%), while boys accounted for 31 (46.3%).

Nutritional Status of Children Before and After Routine Deworming

Table 2 presents the descriptive distribution of nutritional status at the two recorded time points. These percentages describe the analyzed routine deworming group and should not be interpreted as a causal estimate of deworming effectiveness.

Table 2. Nutritional Status Before and After Routine Deworming

Nutritional Status	Before n (%) [95% CI]	After n (%) [95% CI]
Underweight	27 (40.3) [29.4–52.3]	11 (16.4) [9.4–27.1]
Normal	29 (43.3) [32.1–55.2]	44 (65.7) [53.7–75.9]
Overweight	4 (6.0) [2.3–14.4]	3 (4.5) [1.5–12.4]
Obesity	7 (10.4) [5.2–20.0]	9 (13.4) [7.2–23.6]
Total	**67 (100)**	**67 (100)**

Source: Primary Data, 2025. Confidence intervals are Wilson 95% intervals.

Before routine deworming, 29 children (43.3%; 95% CI 32.1%–55.2%) were classified as normal, 27 (40.3%; 95% CI 29.4%–52.3%) as underweight, 7 (10.4%; 95% CI 5.2%–20.0%) as obese, and 4 (6.0%; 95% CI 2.3%–14.4%) as overweight.

After routine deworming, 44 children (65.7%; 95% CI 53.7%–75.9%) were classified as normal and 11 (16.4%; 95% CI 9.4%–27.1%) as underweight. Obesity was recorded in 9 children (13.4%; 95% CI 7.2%–23.6%) and overweight in 3 (4.5%; 95% CI 1.5%–12.4%). The descriptive percentage point change was +22.4 for normal nutritional status and −23.9 for underweight.

Table 3. Spearman Rho Correlation Between Nutritional Status Before and After Routine Deworming

Variables	Correlation Coefficient (ρ)	p value
Nutritional status before and after routine deworming	0.771	<0.001

Source: Primary Data, 2025. The correlation represents ordinal concordance and not the effect of deworming.

The recorded nutritional status categories before and after routine deworming showed strong positive ordinal concordance (Spearman $\rho = 0.771$; $p < 0.001$). This indicates that children tended to retain a similar relative position across the ordered BMI categories. It does not indicate that greater deworming frequency produced better nutritional status because all analyzed children had the same routine deworming eligibility status.

Discussion

Nutritional Status Among School Age Children in the Karuwisi Public Health Center Working Area, Panakkukang, Makassar

The most prominent descriptive finding was the higher proportion of children classified as normal at the later record, from 43.3% to 65.7%, together with a lower proportion classified as underweight, from 40.3% to 16.4%. This pattern is biologically plausible because intestinal helminths can contribute to nutritional deficits through several pathways[13], and Indonesian studies have reported poorer nutritional status among children with helminthiasis[14]. Nevertheless, the present data do not confirm that helminth infection was present before deworming or cleared afterward.

Previous studies provide mixed but relevant context. A multilevel analysis in Tanzania reported favorable associations between deworming and selected child health outcomes[15]. An Indonesian study using albendazole also evaluated nutritional outcomes after deworming[16], and a recent Makassar study reported differences in nutritional status measurements among children receiving deworming medication[17]. These studies differ in age groups, design, exposure measurement, and outcome assessment, so they cannot be used to infer a causal effect in the present sample.

Broader evidence supports a cautious interpretation. A Cochrane review of public health deworming programs in endemic settings found that effects on average growth and several other outcomes were not consistently demonstrated across study settings[18]. Therefore, the more favorable nutritional distribution observed in this study should be described as a temporal pattern among routine users rather than proof that deworming caused the change.

Nutritional status in school age children is multifactorial. Healthy Tadulako Journal evidence has shown that nutrition knowledge and food selection behavior can be related to student nutritional status[19]. A narrative review has also identified multiple child, family, dietary, and environmental determinants of nutritional status[20]. Diet quality, energy balance, physical activity, socioeconomic conditions, growth, and illness could therefore have contributed to the recorded differences in this study.

Helminth exposure is similarly influenced by behavior and environment. Risk factor research among primary school children emphasizes hygiene and sanitation related determinants[21], while another Indonesian study found associations of helminthiasis with handwashing, sanitation, socioeconomic factors, nutritional status, and deworming history[22]. These factors were not measured comprehensively in the present study and may confound any apparent relationship between deworming history and nutritional status.

The absence of parasitological confirmation is particularly important. Stool examination is needed to establish current infection and can directly identify helminth eggs in children[9]. In the same Karuwisi Health Centre area, local evidence has linked personal hygiene with soil transmitted helminth infection[3]. Because the present study did not measure stool confirmed infection or parasite intensity, statements about reduced parasite burden, eradication, reinfection, or improved nutrient absorption cannot be attributed to the observed nutritional pattern.

Health education and program implementation remain relevant even when nutritional effects cannot be isolated. Educational activities can improve awareness of regular deworming among children and families[23], while implementation research highlights the importance of communication, resources, and health worker commitment in school deworming programs[24]. These program elements can support appropriate treatment coverage and complementary hygiene practices.

Albendazole is a broad spectrum anthelmintic commonly used in deworming programs. Its pharmacological action includes disruption of parasite microtubule function and glucose utilization[25], consistent with established anthelmintic pharmacology[26]. This mechanism provides biological plausibility for reducing susceptible helminth infections, but parasite clearance and nutrient absorption were not measured in this study and therefore cannot serve as demonstrated mediators of the observed nutritional distribution.

The choice of growth reference also requires consideration. The original study

classified nutritional status using the 2000 CDC BMI for age reference, so the revision retained those categories for consistency with the collected data. Because CDC charts are a reference derived from United States populations, future studies in Indonesian children should prospectively prespecify the reference standard and consider the WHO 2007 growth reference for ages 5–19 years[12]. Reclassification of the present aggregated categories with another standard was not possible without the original child level anthropometric values and exact ages at each measurement.

The study contributes local descriptive information from a school within the Karuwisi Public Health Center working area and uses parent interviews together with anthropometric assessment. However, interpretation is limited by the absence of a non routine comparison group, insufficient documentation of the timing and provenance of the earlier anthropometric record, lack of stool examination, and lack of measurements for diet, socioeconomic status, sanitation, physical activity, and other nutritional determinants. No adjusted analysis could therefore be used to separate the contribution of these factors.

Accordingly, the principal finding should be understood as a descriptive difference in nutritional status distributions over two recorded time points among children who routinely received deworming medication. The data support continued nutritional monitoring and integrated helminth prevention, but they do not establish deworming as the sole or direct cause of the observed distributional change.

Relationship Between Routine Deworming Medication Intake and Nutritional Status Among School Age Children in the Karuwisi Public Health Center Working Area, Panakkukang, Makassar

The revised analysis reports a Spearman coefficient of $\rho = 0.771$ with $p < 0.001$ and restricts its interpretation to ordinal concordance between the nutritional status categories recorded before and after routine deworming. It cannot be interpreted as a correlation between deworming routine and nutritional status because the nine non routine children were excluded and all 67 analyzed participants met the same routine deworming criterion.

The apparent shift toward the normal category may reflect several concurrent processes, including usual growth, changes in food intake, physical activity, intercurrent illness, socioeconomic conditions, measurement timing, hygiene, and sanitation. Prior evidence indicates that nutritional status and helminth risk are both shaped by multiple behavioral and environmental factors[19,20,21,22]. Thus, the descriptive changes should not be reduced to a single exposure.

Local evidence reinforces the importance of integrated prevention. In Karuwisi, personal hygiene is relevant to soil transmitted helminth infection[3], and objective stool examination is necessary when determining infection status[9]. Future studies should combine documented deworming exposure with stool microscopy or another validated parasitological method so that infection status, treatment response, and nutritional outcomes can be examined separately.

Routine deworming should therefore be positioned within a broader school health strategy that includes appropriate treatment coverage, caregiver knowledge, health education, hygiene, sanitation, and nutritional assessment. Evidence on parental knowledge and adherence supports caregiver engagement[7]. Educational approaches can strengthen awareness of regular deworming[23], while program implementation evidence highlights

the importance of communication, resources, and health worker commitment[24].

The present findings are compatible with studies that have observed favorable nutritional or health patterns after deworming[15,16,17], but they must also be considered alongside evidence showing that population deworming does not consistently produce measurable growth benefits in every setting[18]. Differences in baseline infection prevalence, infection intensity, diet, age, adherence, follow up, and outcome definitions may explain variation between studies.

A stronger design would retain a clearly defined comparison group or prospectively follow the same children with documented dates and child level measurements. Repeated BMI for age values, individual transition data, parasitological testing, dietary assessment, socioeconomic indicators, sanitation, and physical activity would permit an appropriate paired analysis and multivariable adjustment. Such data would allow effect estimates with confidence intervals rather than relying on a rank correlation.

Overall, the study shows a more favorable later nutritional status distribution among children with routine deworming history, while the strong Spearman coefficient reflects rank concordance across recorded nutritional categories. The evidence supports ongoing integrated school health surveillance but does not demonstrate that routine deworming alone caused improvement in nutritional status.

Conclusion

Among 67 children who routinely received deworming medication twice per year, the recorded nutritional status distribution was more favorable at the later assessment: the proportion classified as normal increased from 43.3% to 65.7%, while underweight decreased from 40.3% to 16.4%. The before and after categories showed strong ordinal concordance (Spearman $\rho = 0.771$; $p < 0.001$). Because all analyzed children were routine users, this coefficient is not an estimate of the relationship between deworming routine and nutritional status, and the study cannot establish a causal treatment effect.

Future research should use a prospectively defined longitudinal or controlled design with documented measurement timing, child level transition data, an appropriate growth reference, stool confirmed helminth assessment, dietary information, socioeconomic indicators, sanitation, and physical activity. Paired analyses and adjusted effect estimates with confidence intervals are recommended to determine whether deworming contributes independently to changes in nutritional status.

Acknowledgment

The authors thank all study participants and all parties who supported the implementation of this research. The authors also thank the Research and Community Service Institute, Faculty of Medicine, Universitas Muslim Indonesia, for facilitating the research process.

References

1. World Health Organization. *World Health Statistics 2023: Monitoring Health for the SDGs, Sustainable Development Goals*. World Health Organization; 2023.

2. Mawar M, Rafika R, Herdiana H, Ida AS, Widarti W, Nasir M. Deteksi Tingkat Infeksi Cacing Soil Transmitted Helminths (STH) Pada Ibu Hamil Yang Menetap Pada Pemukiman Kumuh Di Kota Makassar. *J Media Anal Kesehat*. 2025;16(1):9-18. doi:10.32382/jmak.v16i1.1139

3. Afandi NA, Fattah N, Rasfayanah R, Darussalam AHE, Aisyah WN. Personal Hygiene and Soil-Transmitted Helminth Infection Among School Children in

Karuwisi Health Centre Area, Makassar. *Heal Tadulako J (Jurnal Kesehat Tadulako)*. 2025;11(4):681-690. doi:10.22487/htj.v11i4.1800

4. Annisa S, Anwar C. Hubungan Infeksi Cacing Soil Transmitted Helminths (STH) dengan Status Gizi pada Siswa Sekolah Dasar Negeri 200 Kelurahan Kemasrindo Kecamatan Kertapati Kota Palembang. *Maj Kedokt Sriwij*. 2018;50.

5. Fattah N, Mulyadi FE, Al Qindy SM, Safitri A, Husni A, Darussalam E. Pengaruh Infeksi Ascaris Lumbricoides terhadap Status Gizi pada Anak Usia 6-12 Tahun. *UMI Med J*. 2024;9(2).

6. Amalia YN, Sari OP, Munfiah S. Hubungan antara Kecacingan dengan Status Gizi pada Siswa Sekolah Dasar. *J Pendidik dan Teknol Indones*. 2021;1(2):81-89. doi:10.52436/1.jpti.12

7. Andrifo Maldini C, Haris Darmawan E, Fathya Rahma DP, et al. Hubungan Tingkat Pengetahuan Orang Tua terhadap Kepatuhan Pemberian Obat Cacing pada Anak di Surabaya. *J Farm Komunitas*. 2024;11(2). https://orcid.org/0000-0001-8918-2901

8. Tumiwa MJ, Kandou GD, Kepel BJ. Aspek Nonfarmakologis Pengobatan Albendazol pada Cacingan: Review Sistematis. *Indones J Public Heal Community Med*. 2021;2(2). doi:10.35801/ijphcm.v2i2.34540

9. Munir MA, White I, Ramadani AS. Identifikasi Telur Cacing pada Spesimen Feses Anak Anak di Panti Asuhan Raudhatul Ummat Palu. *Heal Tadulako J (Jurnal Kesehat Tadulako)*. 2020;5(1):45-51. doi:10.22487/htj.v5i1.112

10. Kuczmarski RJ, Ogden CL, Guo SS. 2000 CDC Growth Charts for the United States: Methods and Development. *Vital Heal Stat 11*. 2002;(246):1-190.

11. Centers for Disease Control and Prevention. BMI for Age as a Screening Measure. Preprint posted online September 3, 2024. https://www.cdc.gov/growth-chart-training/hcp/using-bmi/bmi-age.html

12. de Onis M. Development of a WHO growth reference for school-aged children and adolescents. *Bull World Health Organ*. 2007;85(09):660-667. doi:10.2471/BLT.07.043497

13. Shokeen P, Pooja K, Neeraj N. From soil to stomach: How worms worsen nutritional deficits: A systematic review. *Int J Health Sci (Qassim)*. 2025;9(S1):557-566. doi:10.53730/ijhs.v9nS1.15798

14. Oktaviana D, Kade Adi Widyas Pranata G, Sumarmi, Kamriana. Nutritional Status and Helminthiasis Infection among Children in Rural Area, Indonesia. *Sci J Nurs*. 2024;10(1):209-216.

15. Moshi CC, Sebastian PJ, Azizi KA, et al. Effect of Deworming on Health Outcomes among Children Aged 12–59 Months in Tanzania: A Multilevel Mixed Effects Analysis. Wan CC, ed. *J Nutr Metab*. 2023;2023:1-8. doi:10.1155/2023/9529600

16. Sungkar S, Ridwan AS, Kusumowidagdo G. The Effect of Deworming Using Triple-Dose Albendazole on Nutritional Status of Children in Perobatang Village, Southwest Sumba, Indonesia. *J Parasitol Res*. 2017;2017:1-5. doi:10.1155/2017/5476739

17. Afriawan AF, Hadi S, Hamzah PN, Darma S, Fattah N. Analysis of the Nutritional Status of Children Who Getting Worm Medicine at Pattingalloang Health Center Makassar. *Borneo J Med Lab Technol*. 2025;7(2). http://journal.umpalangkaraya.ac.id/index.php/bjmlt

18. Taylor-Robinson DC, Maayan N, Donegan S, Chaplin M, Garner P. Public health deworming programmes for soil-transmitted helminths in children living in

endemic areas. *Cochrane Database Syst Rev*. 2019;2019(11):CD000371. doi:10.1002/14651858.CD000371.pub7

19. Laenggeng AH, Lumalang Y. Hubungan Pengetahuan Gizi dan Sikap Memilih Makanan Jajanan dengan Status Gizi Siswa SMP Negeri 1 Palu. *Heal Tadulako J (Jurnal Kesehat Tadulako)*. 2015;1(1):49-57. doi:10.22487/htj.v1i1.6

20. Hulu VT, Manalu P, Ripta F, Sijabat VHL, Hutajulu PMM, Sinaga EA. Tinjauan Naratif: Faktor-faktor yang berhubungan dengan status gizi anak balita. *AcTion Aceh Nutr J*. 2022;7(2):250. doi:10.30867/action.v7i2.632

21. Masra F, Barus L, Indarwati S. Faktor Risiko Cacingan pada Anak Usia Sekolah Dasar. *MJ (Midwifery Journal)*. 2022;2(4).

22. Lailatusyifa N, Sartika RAD, Nuryati T. Determinan Kejadian Kecacingan pada Siswa SD. *J Ilmu Kesehat Masy*. 2022;11(01):57-67. doi:10.33221/jikm.v11i01.1007

23. Maa'idah UN, Arifianto N. Edukasi Pentingnya Pemberian Obat Cacing Berkala Pada Anak. *Abdikes Sunan Giri*. 2024;1(1):32-47. doi:10.48191/abdikes.v1i1.293

24. Khanza Errisya M, Susanti N, Suraya R. Mass Deworming Program for Elementary School Children at Tanjung Selamat Public Health Center. *J Promot Prev*. 2025;8(3):460-478. http://journal.unpacti.ac.id/index.php/JPP

25. Ashri JM, Rahmatul Aini S, Rahim AR. Kajian Pustaka Penggunaan Albendazole sebagai Antelmintik. *J Pendidik Tambusai*. 2024;8(2).

26. Gunawan GS. *Farmakologi Dan Terapi*. 5th ed. Badan Penerbit FKUI; 2012.