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RESEARCH ARTICLE

Anthelmintic mass drug administration in the Kusan Hilir subdistrict, Tanah Bumbu Regency, South Borneo 2021

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Abstract

Background: The evaluation for the deworming programmes or anthelmintic mass drug administration (MDA) had not been done in the Kusan Hilir subdistrict, Tanah Bumbu Regency, South Borneo Province, Indonesia. **Objective:** This study aimed to evaluate the implementation of anthelmintic MDA helminthiasis in Tanah Bumbu Regency. **Methods:** This mixed-method research used an observational cross-sectional approach, with descriptive and bivariate analysis for quantitative data and thematic content for qualitative data. **Results:** From 623 samples, 23(3.69%) subjects had helminth infection with an overall prevalence below the standard (<10%). There were 64.8% of respondents who agreed that taking deworming drugs prevents helminthiasis. In-depth interviews with the managers of the deworming programme in Tanah Bumbu Regency showed that MDA, health promotion, and surveillance or monitoring of helminthiasis were implemented based on Regulation of the Indonesian Ministry of Health (MoH) Number 15/2017. **Conclusion:** The implementation of the anthelmintic MDA programme in Tanah Bumbu Regency was successful.

Introduction

Soil-transmitted helminth (STH) infections are among the most common neglected tropical diseases (NTDs), with an estimated 1.5 billion infected people (WHO, 2023). Women of reproductive age, preschool-aged children, and school-aged children (SAC) are at the highest risk for STH-attributable morbidity (Montresor *et al.*, 2020).

The Indonesian Ministry of Health (MoH) has been implementing a helminth control programme using chemotherapy. Deworming programmes were mandated by MoH Regulation number 15/2017, named anthelmintic Mass Drug Administration (MDA). These programmes have been conducted since 2017, aiming to reduce the prevalence of STH infections among pre-SAC and SAC below 10% (Indonesian Ministry of Health, 2017).

The anthelmintic MDA programme had not been evaluated in the Kusan Hilir subdistrict, Tanah Bumbu Regency, South Borneo, Indonesia. Therefore, there was no updated data on helminthiasis prevalence in the region after the anthelmintic MDA programme. This study aimed to evaluate the implementation of the anthelmintic MDA programme in Tanah Bumbu.

Methods

Study design and setting

This mixed-method research used an observational cross-sectional approach. It was conducted between February and November 2021. The study was approved by the Ethics Committee of the NIHRD, Indonesian MoH, with reference LB 02.01/2 /KE/220/2021.

Tool and data collection

Knowledge, attitude, and practice (KAP) were assessed using a questionnaire from helminthiasis research in 2019 (Rahayu, 2019). It was developed based on the references about clean and healthy living behaviour (PHBS), MDA (Indonesian Ministry of Health, 2011; Indonesian Ministry of Health, 2017), and discussions with parasitologists for face and content validity tests. Construct validity was conducted on 30 students of elementary school. It was seen from the Pearson correlation value using the distribution (Table I) at a significance level of 0.05. The statement item was considered valid if the correlation coefficient value equalled or exceeded the r table value (0.361). The reliability was seen from Cronbach's Alpha value > 0.06 , and then the statement was considered reliable (Sani K, 2018).

Assessment of the KAP questionnaire used the Guttman scale: "yes" or "no" or "don't know" for knowledge, "agree" or "disagree" or "neutral" for attitude, and "yes" or "no" for practice.

The quantitative study was conducted by random sampling. The first stage was the selection of 30 elementary schools using the probability proportional to size (PPS) technique. The second stage consisted of choosing 11 to 22 respondents from grades 1-5 in each school using simple random sampling. Therefore, the total sample was 30×11 to $22 = 330$ to 660 respondents. A survey of stool samples was done by the Kato Katz method (WHO, 2019; Bosch et al., 2021).

The qualitative study was conducted using in-depth interviews with the stakeholders or managers of the helminthiasis programme in the Health Office of Tanah Bumbu Regency. The interview guideline was developed based on MoH Regulation Number 15/2017.

Data analysis

The Chi-square test was used to report on the stool survey, and descriptive statistics were used to report on the KAP survey. Analysis of the quantitative results used Jeffrey's Amazing Statistics Programme (JASP)

application. The qualitative data were analysed by thematic content.

Results

Stool survey

The prevalence of STH infections in Tanah Bumbu was 3.69%, with 23 respondents having helminth infections distributed as follows: *Trichuris trichiura* in 18 respondents, *Hymenolepis nana* in 3 respondents, and *Enterobius vermicularis* in 2 respondents.

Table I: Stool survey and KAP survey

Variables	Total n (%)	Intestinal helminth		p-value
		Negative n (%)	Positive n (%)	
Sex				
Male	305 (48.95)	298 (47.83)	7 (1.12)	0.070
Female	318 (51.05)	302 (48.48)	16 (2.57)	
Age (year)				
6-10	466 (74.80)	455 (71.43)	21 (3.37)	0.063
11-15	157 (25.20)	155 (24.88)	2 (0.32)	

KAP survey about clean and healthy living behaviour (PHBS) and MDA

Respondents' KAP scores related to PHBS and MDA were measured by descriptive analysis. Most respondents (80.7%) knew that contact with soil is a way of transmitting parasitic helminths. The majority (79.9%) agreed that helminthiasis can be prevented by avoiding contact with soil. Also, 95.5% adopted the positive habit of washing hands before having meals and after defecating. Only 16.1% had the inappropriate practice of having long fingernails (Table II).

Table II: Knowledge, attitude, and practice related to PHBS and MDA (N = 623)

Knowledge	Yes	%
1 Stomachache or diarrhoea is among the signs of helminthiasis	437	70.1
2 Loss of appetite is among the signs of helminthiasis	264	42.4
3 Pale or feeling weak is among the signs of helminthiasis	234	37.6
4 Distended abdomen is among the signs of helminthiasis	309	49.6
5 Contact with soil is a way of transmitting parasitic helminths	503	80.7
6 Not washing hands is a way of transmitting parasitic helminths	427	68.5
7 Careless eating/drinking is a way of transmitting parasitic helminths	307	49.3

Attitude		Agree	%
1	Preventing helminthiasis by not contact with soil	498	79.9
2	Preventing helminthiasis by hand washing	442	70.9
3	Preventing helminthiasis by regularly cleaning and trimming fingernails	376	60.4
4	Preventing helminthiasis by using footwear	347	55.7
5	Preventing helminthiasis by taking deworming drugs	404	64.8
Practice		Yes	%
1	Wash hands before having meals and after defecating	595	95.5
2	Wash hands with soap	540	86.7
3	Wash hands after playing outdoors / contact with soil	546	87.6
4	Wash hands with soap after playing outdoors / contact with soil	478	76.7
5	Wear footwear (shoes/sandals) whenever going out	583	93.4
6	Wear shoes when playing in school	446	71.6
7	Defecate in WC/toilet	585	93.9
8	Have long fingernails	161	25.8
9	Have clean fingernails	497	79.8

In-depth interview with stakeholders

Three activities stated in MoH Regulation No 15/2017 have been implemented in the Tanah Bumbu Regency, including MDA, health promotion, and surveillance or monitoring of helminthiasis.

Health promotion and surveillance or monitoring of helminthiasis have been carried out through integration into other programmes.

"All helminth elimination or MDA at the Public Health Center must be carried out every August together with the administration of vitamin A" (The 1st informant from the Health Office of Tanah Bumbu Regency).

"The deworming drugs are given twice a year" (The 2nd informant from the Health Office of Tanah Bumbu Regency).

"... our health promotion is also integrated with public health. We also carried out surveillance or monitoring. For example, we examined feces after MDA had been done by visiting their houses" (The 3rd informant from the Health Office of Tanah Bumbu Regency).

"As far as I know, the planning activities are more about MDA" (The 4th informant from the Health Office of Tanah Bumbu Regency).

Discussion

The prevalence of helminthiasis in Tanah Bumbu Regency was less than 10% after a yearly anthelmintic

MDA. However, MDA, in general, is still done twice a year because stunting is still prevalent in Tanah Bumbu. In some epidemiological situations, countries reduce the frequency of MDA based on a decision tree to maintain the improvement achieved (Mupfasoni *et al.*, 2019).

STHs are a significant public health problem in many developing countries, especially for populations who live in poor settings (Masaku *et al.*, 2017). Indonesia still faces this problem in several areas. Although Southwest Sumba and West Sumba in East Nusa Tenggara reported a prevalence rate exceeding 20%, determining the current STH prevalence in Indonesia remains challenging (Lee & Ryu, 2019; Athiyah *et al.*, 2023).

In India, the pooled prevalence obtained for *Ascaris lumbricoides*, *Trichuris trichiura*, and *Hookworm* in pediatric populations is 25%, 13%, and 10%, respectively (Chopra *et al.*, 2023), while *Ascaris lumbricoides*, *Trichuris trichiura*, and *Hookworms* are the most prevalent STHs in Ethiopia (Aemiro *et al.*, 2022). Meanwhile, Nigeria faces a high prevalence of *Ascaris lumbricoides*, *Strongyloides stercoralis*, *Trichuris trichiura*, and *Hookworms* (Karshima, 2018).

The most common helminth infections were from *Trichuris trichiura*. This parasitic roundworm is a public health problem in Asia (Badri *et al.*, 2022) and one of the most common species causing light-intensity infections in several Indonesian areas (Darlan *et al.*, 2017; Nasution *et al.*, 2019; Wandra *et al.*, 2020; Djuardi *et al.*, 2021).

Based on the results, no significant relationship was found between sex and age with helminth infection,

probably due to the small number of people infected with worms. This result aligns with the findings from Juhar Karo Regency in North Sumatera Province, Indonesia, and a Lugari subcounty in Kakamega County, Kenya (Agustaria *et al.*, 2019; Werunga *et al.*, 2020).

Only 16.1% of respondents had a long fingernail. The literature reported that STH eggs under fingernails contribute to STH infections (Tadege *et al.*, 2022). The high frequency of sucking fingernails was significantly associated with the risk of getting STH infections (Molla & Mamo, 2018).

Of the total sample, 35.2% of respondents disagreed that preventing helminthiasis can be achieved by taking deworming drugs. Participation in MDA programmes for containing STHs is essential (Nath *et al.*, 2018). Various educational interventions can be carried out to increase the awareness of both children and parents regarding the importance of deworming drugs. Community pharmacists need to be actively involved in outreach programmes about drug use and public campaigns (Hermansyah *et al.*, 2018). A review has identified how community pharmacies delivered public health services, particularly those focusing on primary prevention (Thomson *et al.*, 2019).

MDA, water, sanitation, and hygiene (WASH) programmes are among the current strategies to reduce morbidity from STH infection (Weatherhead *et al.*, 2017; WHO, 2020). Water treatment and sanitation interventions support MDA programmes in striving towards the elimination of STH (Ercumen *et al.*, 2019).

This study still needs spatial clustering and hot spot detection. Geographical information systems have potential in the epidemiology and control of human helminth infections (Andrade-Pacheco *et al.*, 2020; Osei & Stein, 2023). The persistence of helminths in the environment makes the eradication difficult. Substantial changes in the landscapes of endemic areas make it challenging to conceive new and directed control programmes for helminthiasis based on multi and transdisciplinary approaches (Sato *et al.*, 2019).

Conclusion

The anthelmintic MDA programme was successful in Tanah Bumbu because it achieved a prevalence of helminthiasis of less than 10%, in line with the MoH's target for the helminth programme.

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