Pattern and Predictors of Soil-Transmitted Helminth Reinfections among Orang Asli (aborigine) Schoolchildren in Malaysia

Hesham MS. Al-Mekhlafi, Atiya AS., Mohammed AK. Mahdy, WA Wan Ariffin, H Che Abdullah and Johari Surin

UNIVERSITY OF MALAYA
KUALA LUMPUR

INTRODUCTION

- **Intestinal parasitic infections are major health problems worldwide → developing countries → rural communities.**

- **More than one billion of the world's population are infected either by one or more of STH, particularly *Ascaris lumbricoides*, *Trichuris trichiura* and hookworm (WHO 2002).**

- **Neglected diseases**

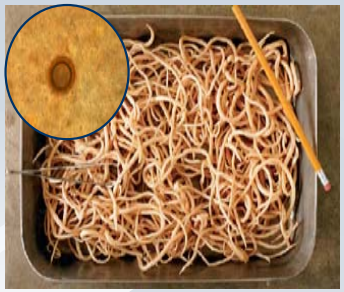
Continued……

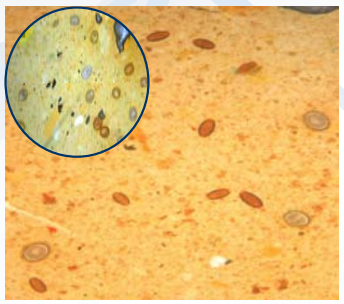
- **‘the cancers of developing nations’** according to **Egger *et al.* (1990).**
- **Complications**

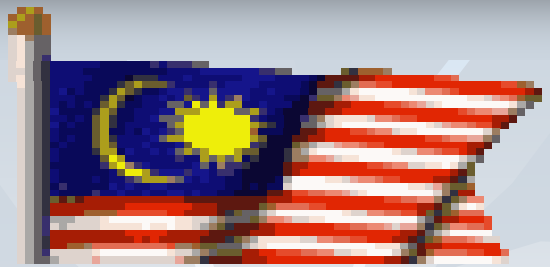
- **Retarded growth (Stoltzfus *et al.* 1997; Al-Mekhlafi *et al.* 2005)**
- **Micronutrient deficiencies (IDA & VAD) (Dreyfuss *et al.* 2000; Congsbak *et al.* 2006)**
- **Impaired learning and school performance (Nokes & Bundy 1994; Ezeamama *et al.* 2005)**

- **Adulthood →Shorten working life & reduce working capacity (Guyatt 2000; Gilgen *et al.* 2001)**
- **Increase the cost of health care**
- **….. Death →(STH together with schistosomiasis represented more than 40% of the disease burden caused by all tropical diseases, excluding malaria) (WHO 1999)**

Continued……







- **In Malaysia**

- ✓ **Since 1970s → high prevalence**

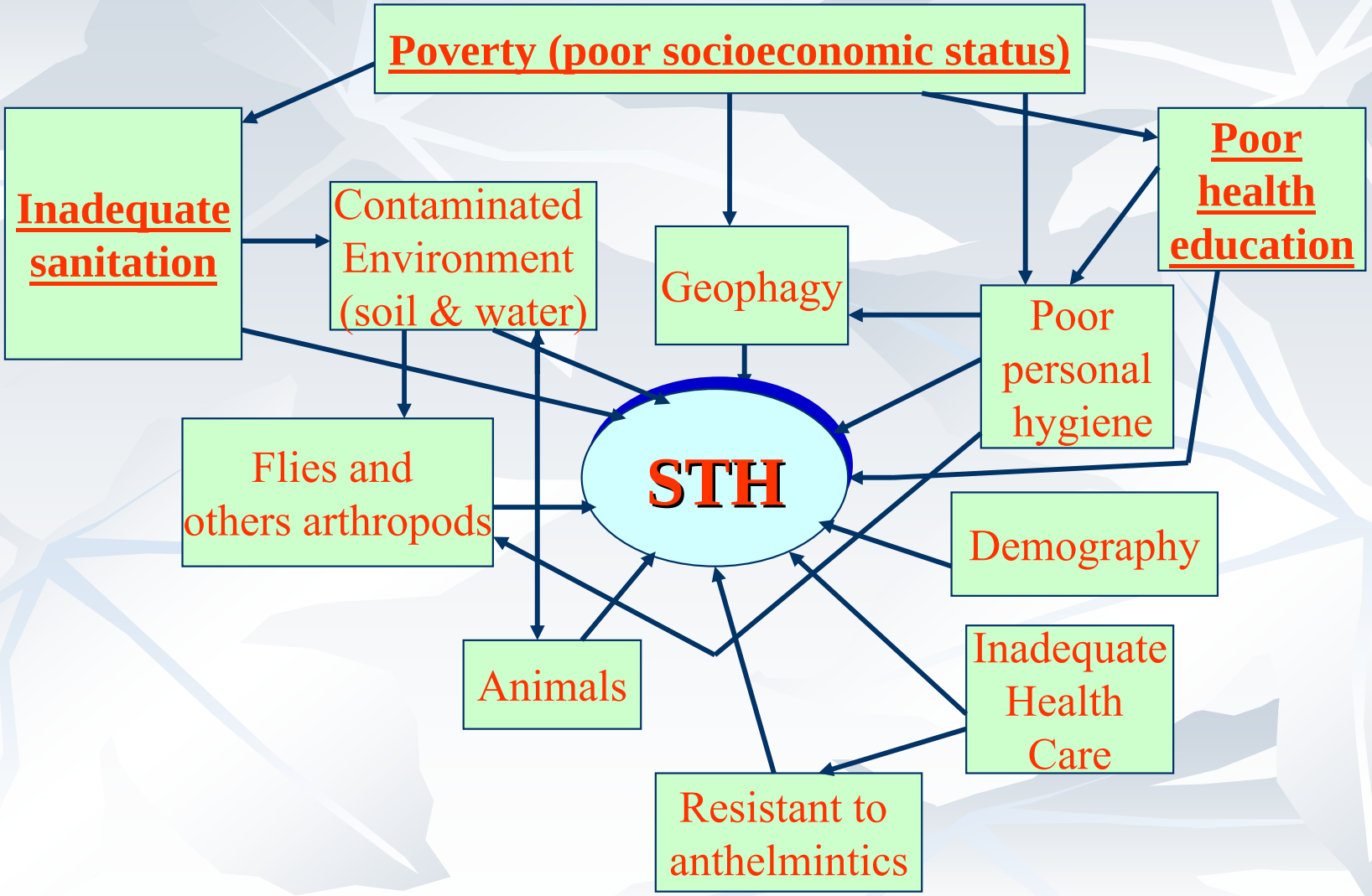
- ✓ **Highly prevalent in Orang Asli communities.**

- ✓ **Prevalence of ascariasis, trichuriasis and hookworm infections in rural areas range between 30.2–69.0%, 15.8–98% and 6–51.0%, respectively**
  (Norhayati et al. 1997; Zulkifli et al 2000; Al-Mekhlafi et al. 2006)

- ✓ **Trichuriasis was the predominant infection.**

Continued……

WEB OF CAUSATION



PROBLEM STATEMENT

- **Despite:**


great development in socioeconomic status

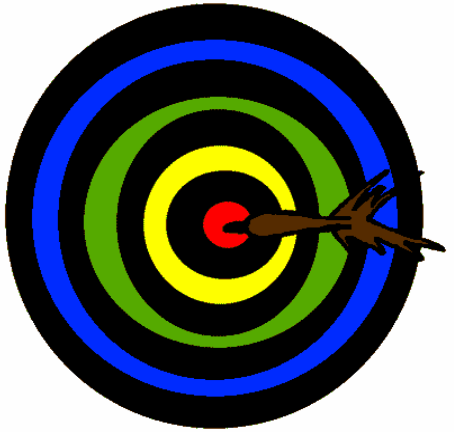

several deworming programs…,


Malaysia is still plagued with STH.


STH continue to have significant impact on public health particularly among rural children

OBJECTIVES

- To determine the current prevalence of STH among rural schoolchildren.
- To investigate the pattern of STH reinfections.
- To investigate the possible risk factors of reinfections



METHODOLOGY

- **Study Area**

Sekolah Kebangsaan Betau

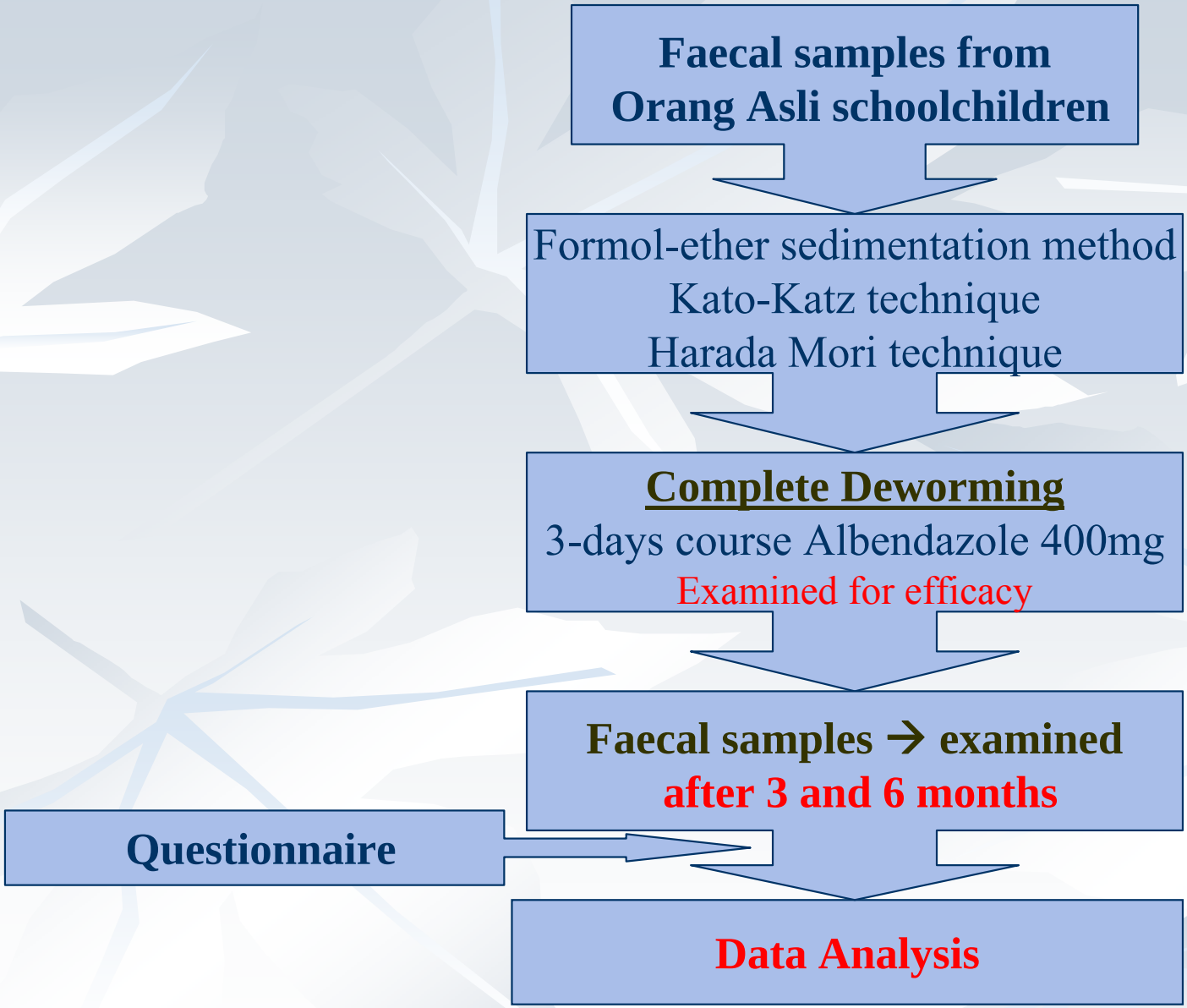
Pos Betau, Kuala Lipis, Pahang, Malaysia. (200 km from Kuala Lumpur)

18 Orang Asli villages

- **Subjects**

(120) Primary Schoolchildren
Age: 7-12 years
Male/Female: 60/60

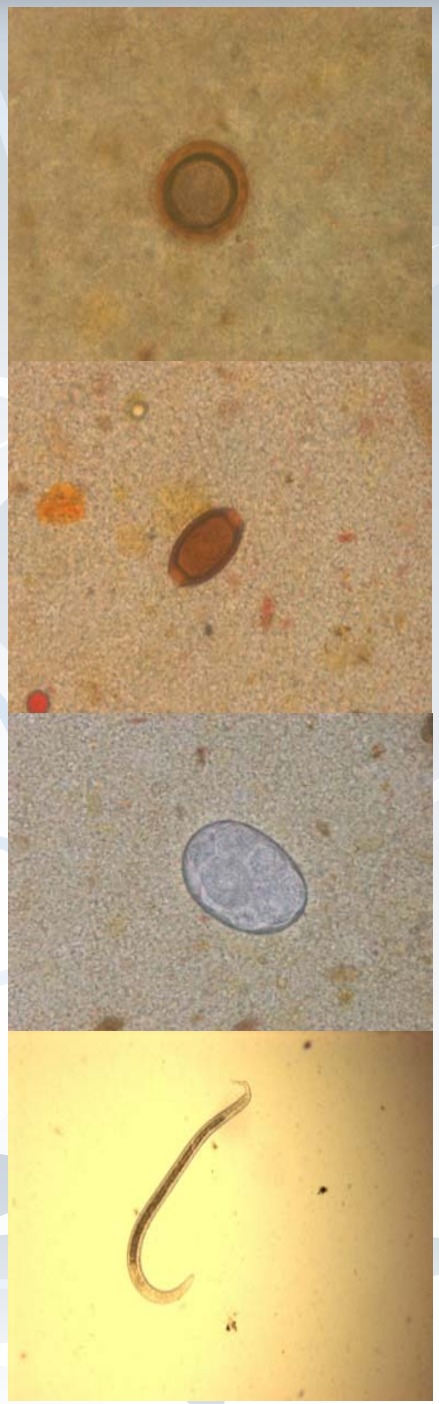
METHODOLOGY



RESULTS

Prevalence of STH among Orang Asli schoolchildren according to severity of infection and gender

	Type of infections		
	Ascariasis No. (%)	Trichuriasis No. (%)	Hookworm infection No. (%)
Intensity of infection			
Negative	41 (34.2)	3 (2.5)	106 (88.3)
Light infection	38 (31.7)	49 (40.8)	13 (10.8)
Moderate infection	24 (20.0)	33 (27.5)	0
Heavy infection	17 (14.2)	35 (29.2)	0
Gender			
Male	39 (65.0)	58 (98.3)	9 (15.0)
Female	40 (66.7)	141 (96.7)	4 (6.7)
Total (%)	65.8	97.5	10.8



STH reinfection

Reinfection rates and reinfection intensities of STH over a period of 6 months after deworming among Orang Asli schoolchildren in Pos Betau, Pahang (n=120)

	Ascaris	*Trichuris*	Hookworm
Prevalence (%)			
Baseline	65.8	97.5	10.8
3 months	18.9	38.7	3.6
6 months	48.1	65.7	5.6
Reinfection rates (%) [a]			
3 months	**28.7**	**39.7**	**33.3**
6 months	73.1	67.4	51.8
Reinfection intensities [b]			
Baseline	2.58	3.30	0.28
3 months	**0.68**	**1.16**	**0.07**
6 months	2.10	2.37	0.12

[a] Number of infected children after deworming/ number of infected children before deworming
[b] Geometric mean counts of egg per gram faeces

Total reinfection rates of STH after 3 and 6 months of deworming

	Ascaris	Trichuris	Hookworm	Total
At 3 months %	28.7	38.8	33.3	**48.9**
At 6 months %	73.1	66.5	51.9	**80.3**

Continued…..

Potential predictors of STH reinfection in rural Malaysian communities (Logistic regression)

Variables	Reinfection rates of STH	
	At 3 months n (%)	At 6 months n (%)
Age:		
≤10 years	40 (46.0)	67 (79.8)
>10 years	15 (62.5)	19 (79.2)
Gender:		
Male	17 (30.9)	37 (68.5)
Female	**38 (67.9) [a, b]**	**49 (90.7) [a, b]**
Fathers' educational levels:		
≥6 years formal education	20 (48.8)	31 (77.5)
No formal education	35 (50.0)	55 (80.9)
Mothers' educational levels:		
≥6 years formal education	11 (50.0)	19 (90.5)
No formal education	44 (49.4)	67 (77.0)
Mothers' employment status:		
Working	31 (57.1)	**48 (90.5) [a, b]**
Not working	24 (44.9)	38 (72.7)
Low household income:		
<RM450/month	38 (45.8)	63 (78.8)
≥RM450/month	17 (60.7)	23 (82.1)
Family size		
≥ 8 members (large)	14 (56.0)	20 (80.0)
< 8 members	41 (47.7)	66 (79.5)
Toilet in house:		
Yes	10 (30.3)	23 (71.9)
No	**45 (57.7) [a, b]**	63 (82.9)
Source of drinking water:		
Piped	48 (50.0)	77 (81.1)
Others (river, rain, well)	7 (46.7)	9 (69.2)
Have animals in house:		
Yes	9 (37.5)	18 (78.3)
No	46 (52.9)	68 (80.0)
Nutritional status		
Stunted children	**30 (61.2) [a]**	42 (87.5)
Non-stunted children	25 (40.3)	44 (73.3)

[a] Significant association ($P < 0.05$)
[b] Confirmed as significant predictors by logistic regression analysis

Some potential source of infections in this area

DISCUSSION

- **STH is highly prevalent among aboriginal children and this may indicate the continuance of this problem.**

  (Dissanaike et al. 1977; Bundy et al. 1988; Norhayati et al. 1997; Zulkifli et al. 2000; Al-Mekhlafi et al. 2006).

- **Trichuriasis is the commonest STH infection in Malaysia with high percentage of severe infections**

  (Norhayati et al. 1997; Sagin et al. 2002; Al-Mekhlafi et al. 2006).

  - Ascariasis in China → 600 million people (Xu et al. 1995)

  - Ascariasis in Yemen (Azazy et al. 2002), Indonesia (Widjana & Sutisna 2000), Brazil (Scolari et al. 2000). - Hookworm in Nigeria (Adenusi et al. 2003), aborigines in Northern Australia (Thompson et al. 2001).

continued

- High reinfection rate→ almost 80% of the children were found to be reinfected with STH by six months after complete deworming→ continuous exposure

- **Lack of sanitation and employment status of mothers** were identified as significant predictors of STH and this was in accordance with previous studies (Muller et al. 1989; Rai et al. 2000; Naish et al. 2004).

continued

- The egg count of *A. lumbricoides* infections at 6 months was almost similar to the baseline situation.

- Likewise, the egg counts of *T. trichiura* and hookworm reinfections were two third and one half of the baseline situation.

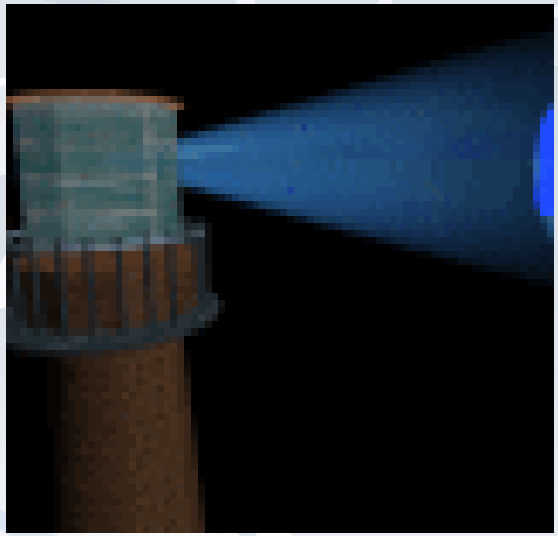
CONCLUSION

- Prevalence and reinfection rates of STH are still very high in rural Malaysian communities.

Thus

- **→ necessitate frequent and periodic deworming among children to reduce parasitic loads, alleviate acute disease and help to reduce transmission**

- **Public health personnel need to re-look at the current control measures and identify innovative and integrated ways in order to reduce STH significantly in the rural communities.**



- **Improvement** of socioeconomic status, sanitation, health education together with periodic mass deworming are recommended to control STH.

THANK YOU