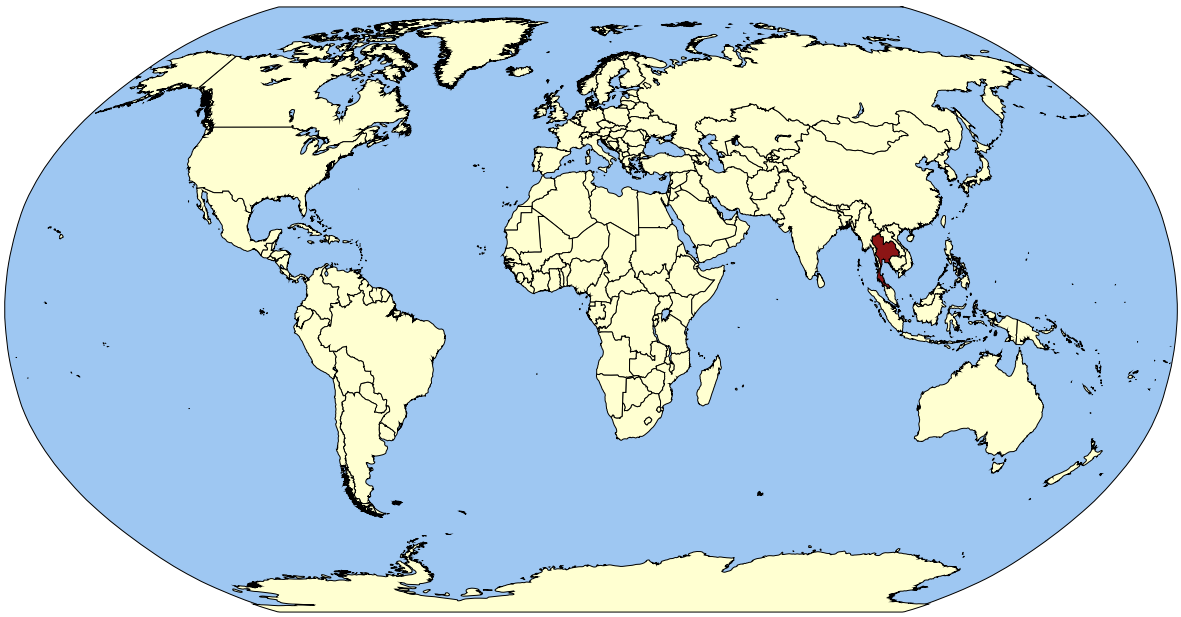
Thailand

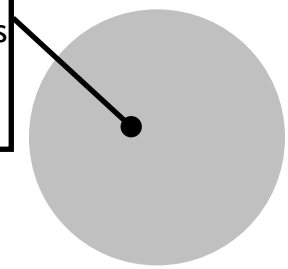


Isolated Schistosomiasis Cases in Thailand

Thailand has not been heavily affected by schistosomiasis, as its eastern border lies on the outskirts of *Schistosoma mekongi*'s range. The first Thai case of schistosomiasis was recorded in 1959, discovered in a rectal biopsy [1]. A 1959-1960 survey found schistosomiasis eggs in the fecal samples of 50 of 2,662 (2%) Thai people in the southern province of Nakhon Si Thammarat [2]. In 1966, two cases of schistosomiasis were found outside the historically defined range of the disease, one of which occurred in the center of the country [1]. There have been other isolated cases found in non-endemic regions, but never more than isolated occurrences [3]. This is likely due to *S. mekongi*'s ecological limitations not favoring its spread from the Mekong River basin [4]. These rare cases likely result from human travel in more endemic regions, but may represent small transmission events outside the assumed habitat of *Neotricula aperta*, the intermediate snail host of *S. mekongi*. There is limited evidence of schistosomiasis transmission in southern Thailand, far from the Mekong River basin, in a small pocket of the Nakhon Si Thammarat state, although only two small villages seem to be affected [5, 6].

Schistosomiasis in Thailand

Endemicity of schisto-somiasis is low or not present at all -- needs confirmation from the WHO



Overview of Thailand [15]

- Population in 2015: 67,976,405
- Official Language: Thai
- Capital: Bangkok
- Constitutional monarchy
- Percentage of Population with Access to Improved Drinking Water in 2015: 97.8%
- Percentage of Population with Access to Improved Sanitation in 2015: 93%

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Schistosomiasis in Thailand and its Neighbors

In 1968, a study of 533 individuals living in the endemic region along the Mekong River in Thailand and Laos found no schistosome eggs in any fecal samples [7]. During the 1970s and 1980s, hundreds of thousands of Lao and Cambodian refugees fled political unrest and entered Thailand, many of whom carried schistosomiasis. For example, 1 of 454 Lao refugees in 1978 and 62 of 24,619 Cambodian refugees at camps in Thailand were found to be infected with schistosomiasis [8, 9]. There is no apparent evidence supporting schistosomiasis proliferation in Thailand due to these imported cases, though there may have been temporary transmission in refugee communities at that time.

However, there may have been more positive effects from Thailand's more schistosomiasis-heavy neighbors: a control program on Laos' heavily infected Khong Island from 1989 to 1993 [4] and one in Cambodia from 1994 to 2002 [10] may have had some spillover effects on Thai schistosomiasis transmission, as elimination was declared around that time.

A Border Case

No evidence was found in the literature to suggest any coordinated schistosomiasis control programs in Thailand. Nevertheless, a World Health Organization (WHO) report estimated 0 people infected and 0 people at risk of schistosomiasis by 1989 [11]. Another WHO report stated in 2000 that "as there have been no recent autochthonous cases of schistosomiasis in Thailand and Turkey, there is a question as to whether these countries should be considered endemic [12]." In all, Thailand appears to be a border case with scattered schistosomiasis that has largely been suppressed by the fact that only small portions of the country are ecologically suitable to *S. mekongi*.

S. mekongi

The eggs of *Schistosoma mekongi*, shown **left**, cause damage to the intestines when adult worms infect humans.

The Intermediate Host: *Neotricula Aperta*

Major water resource development projects in eastern Thailand, like the Sirindhorn Dam and the Pak Mun Dam, may have affected schistosomiasis transmission. Although not confirmed as a general phenomenon, it is worth noting that recent evidence suggests that *S. mekongi* intermediate host snails may respond differently to the construction of dams and water projects compared with other major human schistosomes (*S. mansoni*, *S. haematobium*, and S. *japonicum*) [13]. *N. aperta* snails prefer fast-flowing, highly oxygenated water, so when impoundments and irrigation projects divert and block water flow, leading to changes in depth, flow rate, and sometimes calcium concentration, there may be a corresponding negative response in the *N. aperta* populations. This is opposed to the response of *Biomphalaria* and *Bulinus* snails to dams, which is the reverse – these snails benefit from the construction of slow-moving pools of water as a consequence of dam-building. Since the *S. mekongi* parasite is shed in smaller numbers from each snail (average of 42 per day rather than up to 2000/day for other species) [14], transmission may rely on high snail population densities, which may have been generally excluded after irrigation and development altered natural waterways in Thailand.

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Schistosomiasis cases in Thailand have been isolated and focal, and was likely brought in from neighboring countries. No heavy control has been needed, and Thailand awaits confirmation from the WHO on its non-endemic status for schistosomiasis.