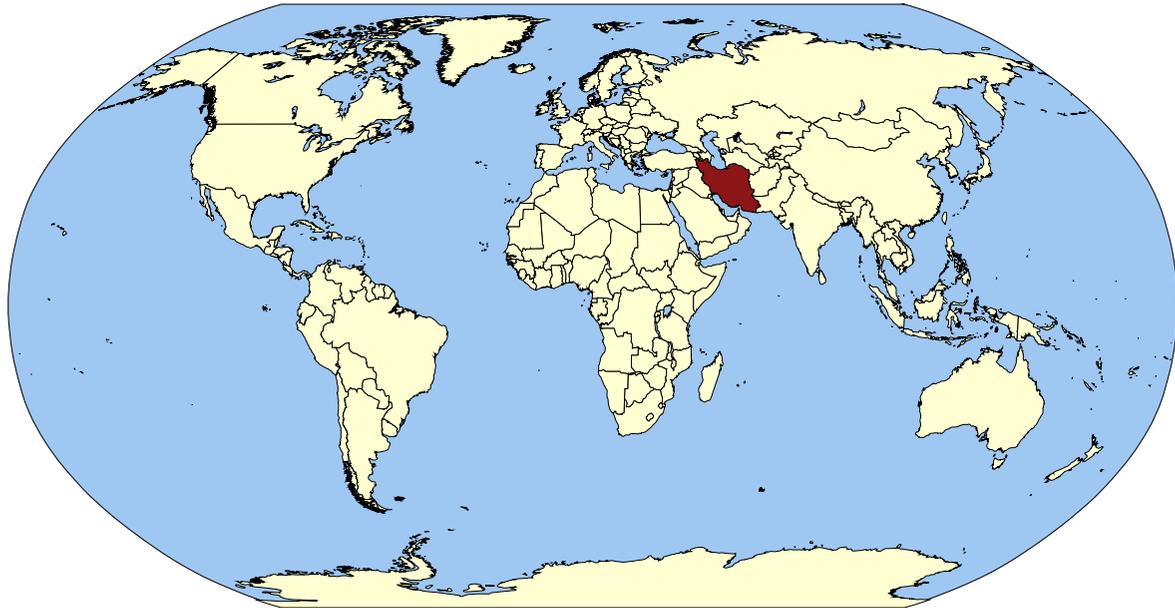


Iran

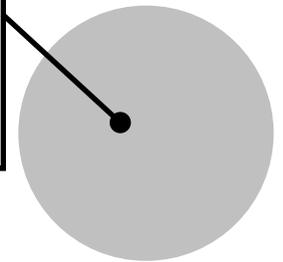


The History of Schistosomiasis in Iran

Schistosomiasis in Iran gained attention in the summer of 1948 when employees of the Anglo-Iranian Oil Company reported symptoms indicative of urinary schistosomiasis [1]. Most of the employees came from districts near Ahwaz, an area known for heavy traffic with neighboring endemic regions along the east bank of the Tigris River in Iraq [1]. Not long after, *Bulinus truncatus*, the intermediate snail host perpetuating transmission of *Schistosoma haematobium* in Iraq, was also discovered in Iran. Yet at the time, only dead shells of *B. truncatus* could be recovered [2]. By 1953 schistosomiasis officially became a matter of public health concern. Khuzestan Province, a region in the southwest of Iran covering an area of about 157,000 km², became the area of most concern [3,4]. At the time, Khuzestan Province was also part of Shah Mohammed Reza Pahlavi's second seven-year agricultural and irrigation development plan, spanning from 1955 to 1962, to restore Khuzestan to its ancient prominence as a food provider [5].

Schistosomiasis in Iran

Schistosomiasis was
**successfully
eradicated**
in 2012.

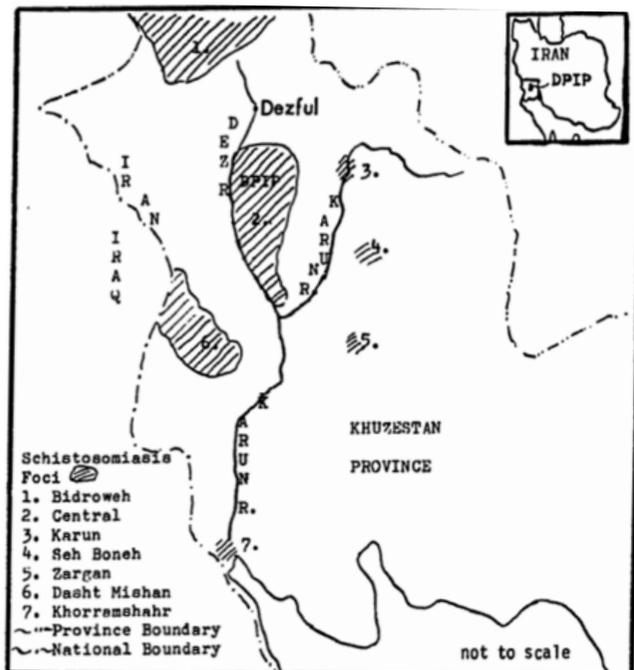


Overview of Iran [11]

- » Population in 2015: 81,824,270
- » Official Language: Persian
- » Capital: Tehran
- » Theocratic Republic
- » Percentage of Population with Access to Improved Drinking Water in 2012: 95.9%
- » Percentage of Population with Access to Improved Sanitation in 2011: 89.4%

Irrigation and Infected Regions

In 1959, the Iranian government approached the World Bank for a loan to finance their development project [5]. In the same year, attempts to control urinary schistosomiasis in Iran were initiated through what would later be referred to as the WHO-assisted Bilharziasis Control Project, (BCP) [3]. The control project deliberately overlapped the areas targeted for development in Khuzestan Province, with a specific focus on the Dez Pilot Irrigation Project (DPIP) located around the city of Dezful and the Sugar Cane Area Project. In 1961, the DPIP Project officially began with an estimated baseline prevalence of 22% and seven main schistosomiasis foci identified throughout the entire Khuzestan Province [5]. The foci are **shown in the shaded regions below [5]**, and represent a small subset of the large state of Iran. By 1965, the entire DPIP Area, located south of the town of Dezful and spanning 25 km on the north-south axis and 15 km on the east-west axis, was receiving regulated water [5]. In the southern half of this project area, the concurrent development project created particularly suitable new snail habitats along the river where marshes were abundant [5].



Pilot Control Strategies

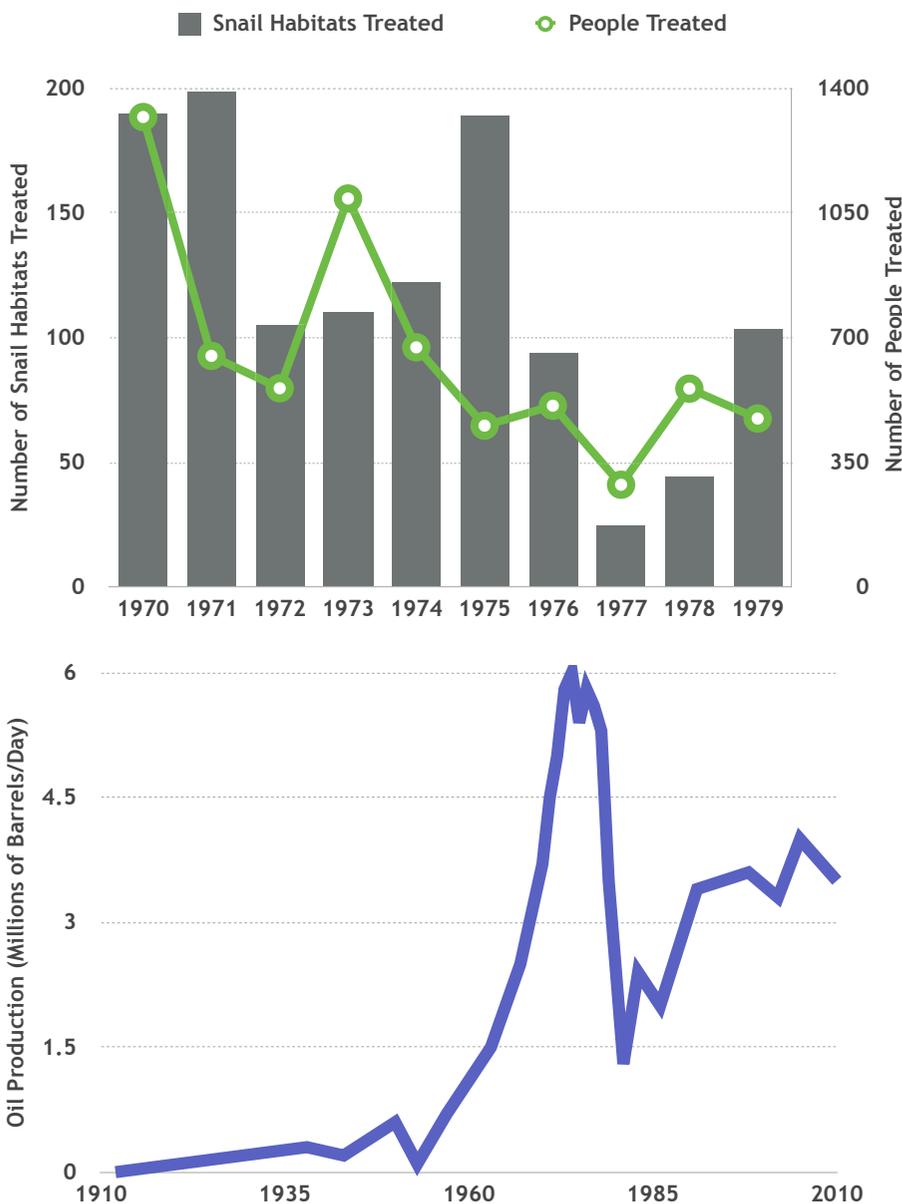
However, through BCP's implemented pilot control plans initiated in 1964, prevalence increases were to a certain extent curbed. In the DPIP area, the baseline prevalence was 22% in 1961, 14.7% in 1965, 7.0% in 1966, and 23.7% in 1977 [5]. The combined approach of BCP, which included chemotherapy (niridazole), mollusciciding (copper sulphate, sodium pentachlorophenate, or niclosamide), and engineering measures, achieved some initial success. The surprising spike in prevalence in 1977 is most likely due to the inability of control projects to keep pace with the creation of extended snail habitats. Indeed, it was noted that 7 of 43 kilometers of new irrigation canals and 5 of 8 water reservoirs in the Sugar Cane Area, specifically, became highly infested with *B. truncatus* snails 4-5 years after use. New breeding places along the newly constructed canals were also prevalent in the completed Irrigation Pilot Area [4]. Yet, the local spike in prevalence did not affect the overall drop country-wide, which, due to the expansion of control efforts throughout Khuzestan Province, led to a decrease in prevalence from 11.3% in 1967 to 0.74% in 1979 [4,3].

Expanding Control Strategies

After the pilot efforts of BCP, control efforts were expanded more thoroughly throughout the whole area of Khuzestan Province in 1967. By the end of 1967, 197 *Bulinus* habitats were treated exclusively with niclosamide [6]. In the same year, niridazole was administered in mass treatment campaigns of infected individuals [7]. The noted strategy at the time was to implement chemotherapy after snail control had reduced transmission to a minimal level [7].

Intensive, Successful Control in the 1970s

In 1968, 127 habitats were treated, and follow-up surveys revealed that 38 became repopulated while 89 remained free of *Bulinus* snails [6]. The expanded control program also included drainage of swamps and the filling in of other snail habitats, improvement of water supply and sanitation, and health education [7]. The expansive control efforts in 1967 occurred during a period of increasing oil production in Iran. While continued control efforts were still in place, oil production peaked in 1974 and international oil prices nearly quadrupled from 1973-1974 [8]. As a result, Iran's oil revenues increased significantly during this time period. Even though the Iranian Revolution in 1979 caused production to rapidly fall, there is no doubt that Iran's success in the oil industry from 1960-1978 coincided with the time frame of expanded schistosomiasis control efforts. Thus the economic success may have played a crucial role in generating support and resources for thorough schistosomiasis control effort and implementation. Moreover, national policy in the 1970s dictated that almost all revenues were to be spent domestically, especially for infrastructure & development [8].



Trends in Oil Production and Schistosomiasis Prevalence

(Top) In the 1970s, Iran cracked down on schistosomiasis through a successful snail control program. [3]

(Bottom) Oil production in Iran has developed over the past century. Iran experienced a large economic boom from oil in the 1970s. [8]

Overall Success

Iran's success is largely attributed to a concerted national program, with support from the World Health Organization, to implement a control strategy that integrated snail control, human chemotherapy, and sanitation improvements [5]. It is possible that economic success during this time period generated reliable resources and a sound infrastructure that facilitated thorough schistosomiasis control efforts. It is also important to consider the scope of Iran's schistosomiasis problem in understanding its success in controlling schistosomiasis transmission -- transmission was isolated to known foci of infection within Khuzestan Province and even within a given village. This low nation-wide connectivity may have aided in control measures [4]. Overall, from 2000 to 2001, no positive cases were detected [9]. In 2012, Schistosomiasis in Iran was declared eliminated [10].

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