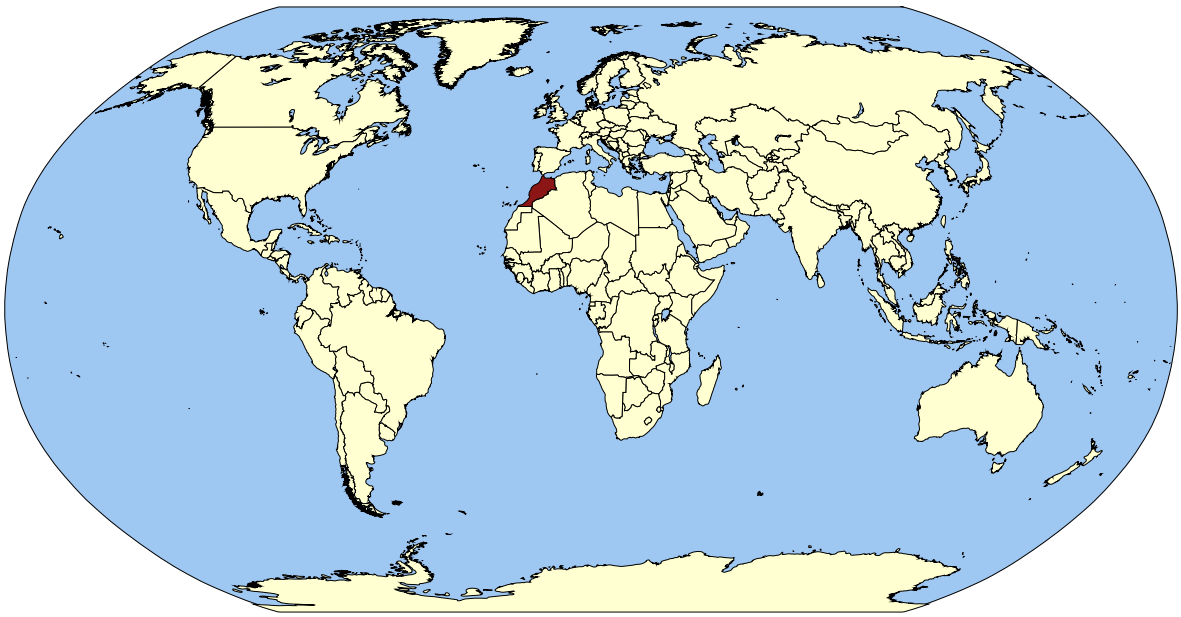
Morocco

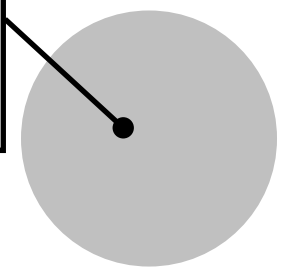


The History of Schistosomiasis in Morocco

Schistosomiasis was first described in Morocco in 1914, while the region operated under French colonial rule. A French doctor detected several cases of the disease in European soldiers in Marrakesh [1]. Descriptive records of the disease date back many centuries, the first of which described cases of “urinating blood” from caravans entering the region from Mali [1]. The occurrence of the disease, which is caused exclusively by *S. haematobium* and transmitted by Bulinus truncatus snails in Morocco, was distributed at very low prevalence in a highly focal fashion in the first half of the 20th century due to the region’s scarcity of water and extensively dry habitats [2]. French doctors continued to research the disease, providing the first description of *Bulinus* snail distributions in 1922 in the Marrakesh area [1]. The earliest studies mapping schistosomiasis distribution report focal occurrence of the disease in isolated oases in the poorly accessible southern region, and the disease was not considered a public health priority [2].

Schistosomiasis in Morocco

Schistosomiasis transmittion **interrupted** due to successful snail control and treatment programs



Overview of Morocco [7]

- Population in 2015: 33,322,699
- Official Languages: Arabic & Tamazight
- Capital: Rabat
- Constitutional Monarchy
- Percentage of Population with Access to Improved Drinking Water in 2015: 85.4%
- Percentage of Population with Access to Improved Sanitation in 2015: 76.7%

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UPSTREAM ALLIANCE

Irrigation and Schistosomiasis

However, upon gaining independence from French colonial rule in 1956 the new Moroccan government set its sights on agricultural expansion, developing irrigation schemes that would prove to enlarge the schistosome endemic areas in the country [1]. Beginning in 1967, as the country embarked on the construction of numerous irrigation schemes, *B. truncatus* and *S. haematobium* spread to new foci in the central and northern regions of Morocco [3]. The number of cases reached its highest point yet recorded in 1973 with 13,416 cases, or 0.079% of the 16.96 million population that year, presumably as a consequence of new irrigation schemes [2]. In 1978 it was estimated that 11% of the rural population in 16 of 47 provinces were at risk [4].

Large-scale Control

In response to the spread of disease alongside hydroagricultural projects, preparations to launch a national level control program commenced in 1976 [2]. After 3 years of preparation, a pilot phase in 3 provinces took place between 1979 and 1981, and full coverage began in 1982 and prevalence rapidly declined [3]. The program had 4 elements: (1) free screening and treatment, (2) snail control using environmental modification or molluscicide depending on the context through a collaborative effort between health, agriculture, forestry, and water resource sectors (3) health education, and (4) recruiting support from non-health sectors including services from administration, agriculture, and education at local and provincial levels [5]. Human treatment was selective and mass treatment was rarely used, only in localities where prevalence exceeded 4% [3,6]. Until the introduction of praziquantel in 1987, niridazole and metrafonate were used for chemotherapy. Snail control campaigns were carried out in focal areas every 1 to 2 months.

Snail Control and Wrapping Up

Along with treatment programs, Morocco targeted the intermediate host of the schistosomes. Control programs recommended environmental modification to eliminate snail habitats, but teams also used the molluscicide niclosamide as a form of snail control. The overall program outcomes were evaluated quarterly or annually, and success was measured by the reduction in disease incidence amongst exposed communities and the reduction in the total number of disease localities [3]. By 1994, major strides had been made towards successfully controlling the disease and the program shifted from morbidity control to elimination [3]. During this phase, which aimed to interrupt transmission by 2004, mobile teams conducted annual mass screening campaigns at the remaining focal localities, as per protocol [6]. From 2005-2010 Morocco entered a “consolidation phase” wherein surveillance, control, and rapid response were carried out. Only 30 cases were detected during this period [6].

Schistosomiasis Now

Following continuous control efforts on a national scale beginning in 1982, the disease is currently considered “interrupted” by the World Health Organization. While this state of achieved transmission control needs to be validated, Morocco’s story represents a case wherein a sustained integrated approach to disease control proved successful. The final stages of Morocco’s elimination strategy relied on mobile units that traveled between focal areas to conduct surveillance and treatment campaigns and snail control implementation, a strategy that while proved extremely effective, also required a great deal of human resources and expense [6]. Success in eliminating transmission has also been attributed to a decade long rainfall deficit from 1990 to 2000, which resulted in widespread drying of irrigation canals and reductions in the area of suitable snail habitat and intermediate host densities, undoubtedly contributing to long-term transmission control [5].

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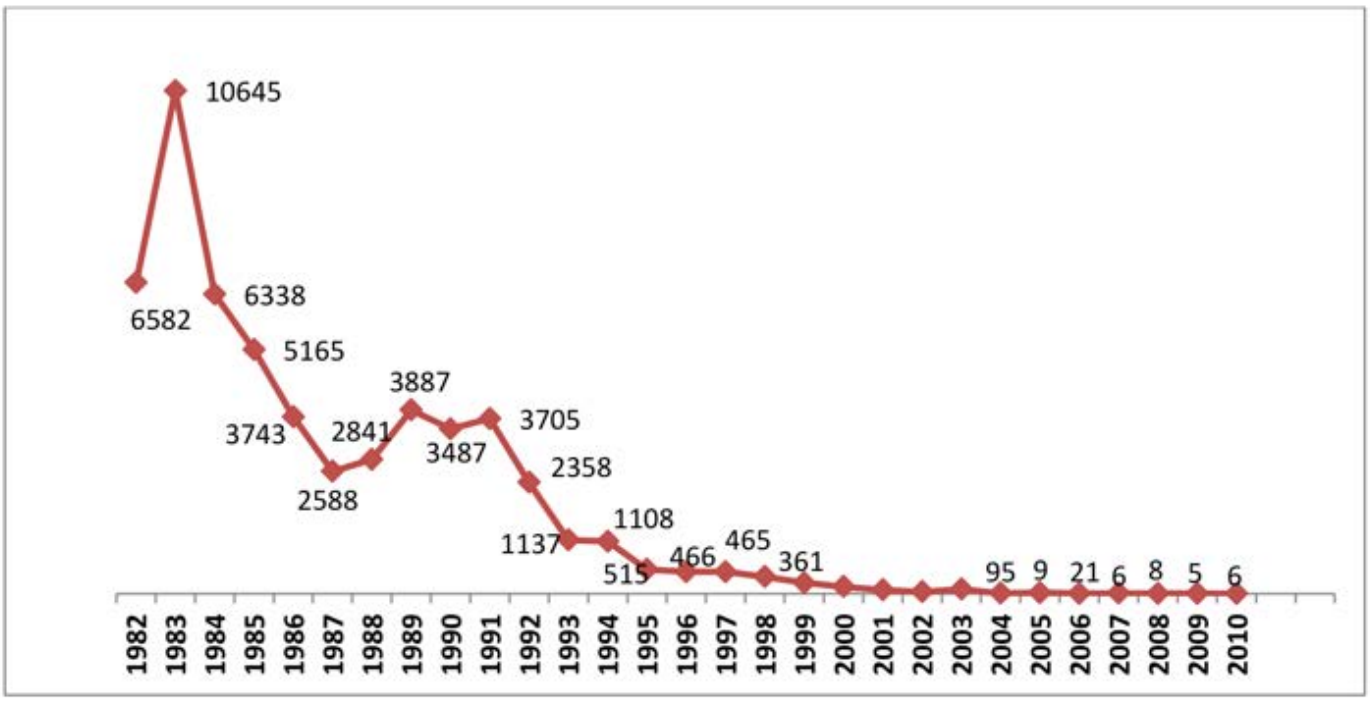

Fig. 1: Evolution of cases of Schistosomiasis, Morocco 1982 - 2010

The Decline of Schistosomiasis Cases [6]

The graph **above** shows the steady decline of new schistosomiasis cases over the years, taken from Barkia et. al. [6]. The decline in new cases is due to successful control programs that interrupted transmission. Today, almost 0 cases are reported each year.

References

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