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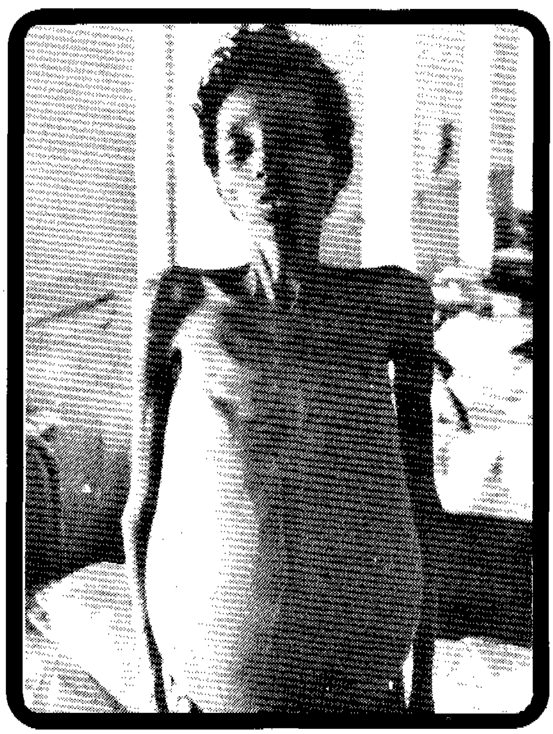
REPORT ON IDWSSD IMPACT ON SCHISTOSOMIASIS



INTERNATIONAL DRINKING WATER SUPPLY AND SANITATION DECADE

1981-1990

STEERING COMMITTEE FOR COOPERATIVE ACTION

JULY 1990

Schistosomiasis is a global parasitic disease. 555 million persons are exposed and over 200 million are infected. Improving community water supplies is a justified intervention that has been shown to help to prevent spread of the disease. An estimated 18.4 million persons have been protected from infection by improved community water supplies.

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CONTENTS

1. Schistosomiasis – a Global Parasitic Disease

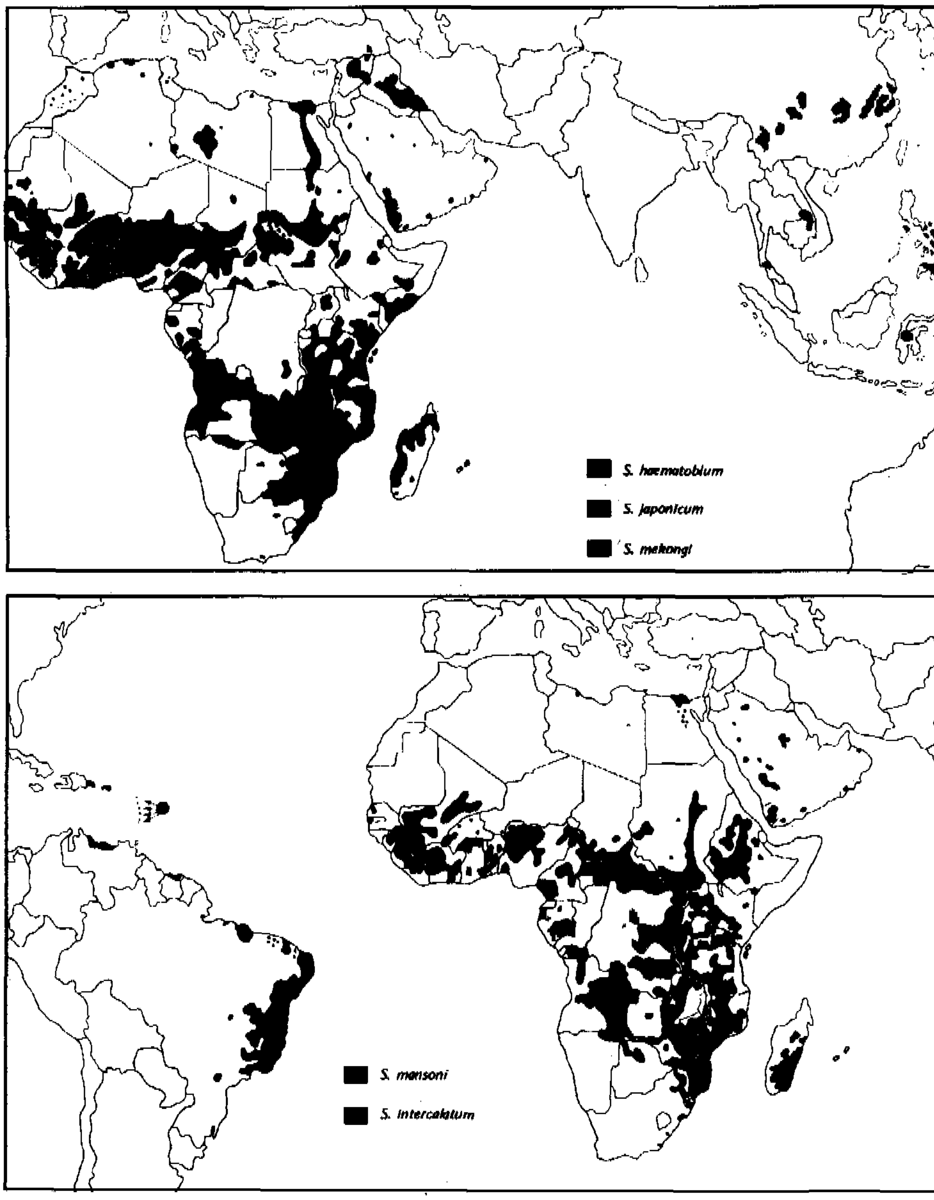
200 million infected

Schistosomiasis, also known as *bilharziasis* after its discoverer, Bilharz, is a global parasitic disease. It occurs or is endemic in 76 countries in Africa, the Middle East, China, South East Asia, Indonesia, the Philippines, South America, the Caribbean and, historically, Japan. The World Health Organization currently estimates up to 200 million persons infected with schistosomiasis and another 400 million potentially exposed and at risk of infection.

Beginning in the last century and continuing dramatically in this century, a plague of schistosomiasis has occurred. The disease now ranks second in terms of socio-economic and public health importance in tropical and sub-tropical areas, immediately behind malaria.

COUNTRIES WHERE SCHISTOSOMIASIS IS ENDEMIC

Algeria	Angola	Benin
Botswana	Burkina Faso	Burundi
Cameroon	Central African Republic	Chad
Congo	Equatorial Guinea	Ethiopia
Gabon	Gambia	Ghana
Guinea	Guinea-Bissau	Ivory Coast
Kenya	Liberia	Madagascar
Malawi	Mali	Mauritania
Mauritius	Mozambique	Namibia
Niger	Nigeria	Rwanda
Sao Tome and Principe	Senegal	Sierra Leone
South Africa	Swaziland	Togo
Uganda	United Republic of Tanzania	Zaire
Zambia	Zimbabwe	
Antigua and Barbuda	Brazil	Dominican Republic
Guadeloupe	Martinique	Montserrat
Puerto Rico	Saint Lucia	Suriname
Venezuela		
Egypt	Iran	Iraq
Jordan	Lebanon	Libya
Morocco	Oman	Saudi Arabia
Somalia	Sudan	Syrian Arab Republic
Tunisia	Turkey	Yemen Arab Rep.
Yemen, Democratic		
India	Indonesia	China
Malaysia	Thailand	Laos
Kampuchea	Japan	Philippines



Global distribution of schistosomiasis attributable to the main species of shistosomes is indicated on the two maps

There are three important human schistosome species; *S. haematobium, S. mansoni* and *S. japonicum.* The global distribution is somewhat different for each species as shown on the maps.

Impact

While accurate measures of schistosomiasis-related illness, incapacity and premature death are not available, its widespread occurrence means that schistosomiasis has huge public health consequences. The disease also has a negative impact on individual productivity and socio-economic development. Demands on primary health care delivery in endemic communities can be overwhelming. In most endemic communities the prevalence of infection is highest in 10 to 14 year old children. In many communities of Africa, over 70% of village school children can be infected.

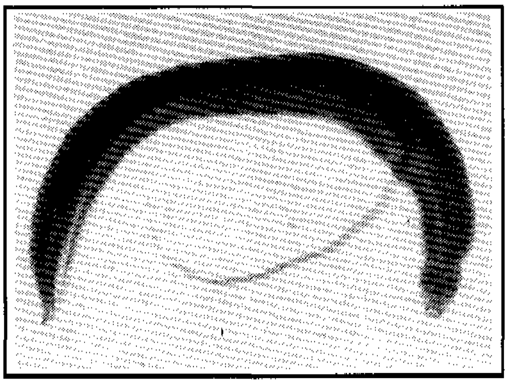
These abstract numbers reflect dramatic personal experiences. One only has to visit an endemic village and witness the high occurrence of hematuria or bloody urine among children. Hematuria is the classical clinical sign of urinary schistosomiasis. Hematuria in male children has been so common for so long in some countries that this clinical condition is associated with puberty, in a similar manner that menstruation is associated with puberty among girls.

History

Schistosomiasis has been found in Egyptian mummies dating from between 1250 and 1000 BC, and hematuria is mentioned in many Egyptian papyri. It has also been found among the Chinese dating back 2,000 years. However, the plague of schistosomiasis seen today, more than likely developed over the last 100 years or so. To understand how this came to pass, one must know the parasite life cycle and how the parasite is transmitted to the human population.

Life cycle

Humans acquire infection by contact with fresh water contaminated with *schistosome cercaria*, a macroscopic larval form released by certain species of fresh water snails. The larva on contact with a human can penetrate the unbroken skin. The cercaria then develop into small worms which infest the blood vessels of the intestines and bladder.



The adult worms produce eggs or ova. These microscopic eggs can pass through the walls of the intestine or bladder and are released to the outside through the urine or stool. If the eggs come in contact with fresh water they hatch and release another larval form called *miracidium*, which can seek out and infect snails. Later the snail will release the larval cercaria. If the snails are not present, schistosomiasis transmission will not occur.

People with schistosomiasis have the characteristic eggs in their stool or urine. Examination of urine and or stool for eggs is required to make a diagnosis. Some people may be infected with only a few worms and may appear healthy. The number of worms increases in a person who is infected and re-infected, usually over a period of several years, by repeated exposure to contaminated surface waters.

Bathing or swimming in an infected stream or canal is a major risk for children.

2. The disease

It is the eggs that pass through the body tissues that causes a person with schistosomiasis to become ill. Damage to the liver, spleen, kidneys, bladder (including bladder cancer) and to the central nervous system occur to those with heavy infections. Much of the chronic damage to these organ systems is irreversible and in severe cases the individual may die from internal bleeding.

There has been great progress in the development of new drugs for treating schistosomiasis. The most recent and by far the best drug is called praziquantel. Praziquantel can be taken in one oral dose, has little side effects and is effective in killing the worms in the body.

A water-based disease

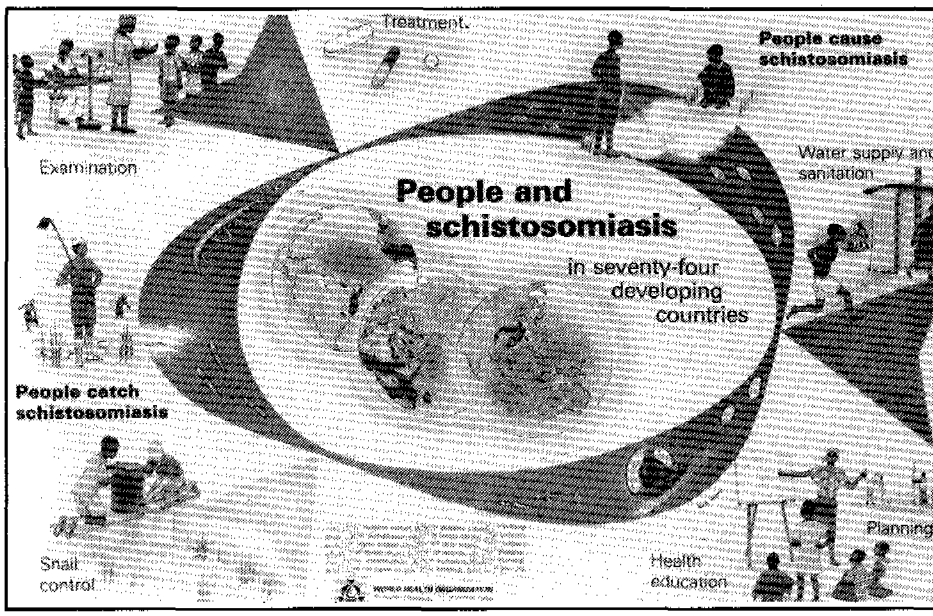
Schistosomiasis is one of many water-related diseases. It is not a waterborne disease like cholera or typhoid. People rarely get infected by drinking contaminated water. The infection is not spread directly from person to person but rather through the snails. Infection is acquired by water contact and that is why schistosomiasis is called a water-based rather than a waterborne disease. People, usually rural villagers, become infected by contact with surface waters contaminated with cercaria. This could include contact with all kinds of unprotected water sources such as streams, rivers, lakes, ponds and very frequently irrigation canals. Any contact with contaminated waters can result in infection, this includes the following activities:

collecting water for use in the village home,

washing hands,

washing clothes,

washing utensils,



washing animals,

washing after defecation

bathing

swimming by children, and

occupations that require human water contact such as irrigation, irrigation canal and drainage construction, canal cleaning and fishing.

In the absence of reasonable access to a safe community water supply, these water related exposures are frequently seen in endemic villages and communities.

Water resources

In endemic areas, schistosomiasis and fresh water seem inseparable. This is exacerbated by water resources development schemes such as man-made lakes, and especially by the construction of massive inter-laced irrigation canals. The man-made lakes provide the necessary perennial water supply for the canals. And the canals bring water closer to communities, making it easier for villagers to have contact with and contaminate the water. Perhaps even more important is that canals and lake shores provide a vast increase in new and ideal habitats for the snails. In endemic areas, the snails proliferate in the canals and on lake shores.

In the absence of any control measures, conversion of an endemic area to perennial irrigation can have a dramatic impact on schistosomiasis prevalence. This was first observed over 50 years ago in a southern area of Egypt where four villages were studied. Before irrigation canals were constructed, villagers had been using the river as a water supply. Prevalence of schistosomiasis averaged less than 5%. After three years, the villagers were examined again. Prevalence of schistosomiasis had increased to over 75% of all age groups, with 100% infection among the children. Villagers had changed from the river to using the more conveniently located canals. Children were less afraid to swim in the nearby shallow canals (compared with the river).

Prevention

Prevention is a fundamental concept of public health and schistosomiasis can be prevented. Water resources development designed to minimize snail habitat and combined with improved water supplies is an important approach to the prevention of schistosomiasis. The WHO/FAO/UNEP Panel on Environmental Management for Vector Control (PEEM) has developed recommendations for preventing vector-borne diseases, including schistosomiasis, by incorporation of health safeguards in water resource development.

One method of prevention is to kill the snails. Without snails transmission of infection would stop. Over the years there have been many demonstration projects that have tried repeatedly to kill the snails with chemicals. Killing snails has never been very successful, however.

Infection requires contact with contaminated surface water. Therefore, any method to stop or minimize contact with contaminated water would stop the acquisition of new and repeated infections. Using sophisticated computer modeling techniques, it has been predicted that partial reduction of water contact should have a proportionately greater effect in diminishing transmission than would similar reductions in snail populations.

An important point to remember is that snails will not become infected and the disease will not be transmitted if urine and feces from infected persons do not go into surface waters. This suggests sanitary disposal of human excreta, which would halt the release of cercaria and stop transmission of infection.

Provision of laundry facilities at a community water supply site reduces the need for women to use contaminated streams

Treatment with praziquantel is important for infected individuals. Treatment of large groups in endemic communities may reduce the number of viable eggs in the urine or stools to the point where snails are no longer infected. Preventing eggs from hatching and infecting snails by treatment of the community population is similar to the sanitation approach.

Approaches for the control of schistosomiasis today start with health education and integration of the four previously mentioned control methods.

8. What has been the impact of the IDWSSD on schistosomiasis?

So, preventing contact with contaminated surface waters and preventing eggs from reaching water supplies are two approaches for reducing schistosomiasis transmission. It follows that by improving water supplies and sanitation in endemic communities, transmission of schistosomiasis may be prevented or at least reduced. What is the evidence to support this theory and what estimates can be made in regard to the impact of IDWSSD on schistosomiasis?

The evidence: Sanitation

Schistosomiasis has been recognized as a major public health problem for many decades. One of the largest field studies of schistosomiasis was completed in the 1930's in Egypt where tens of thousands of villagers were examined. The scientists in charge of this study were well aware of the life cycle. Schistosomiasis was very common in the irrigated areas which covered much of rural Egypt. It was also evident that sanitation such as simple latrines and community water supplies were virtually non-existent at that time in rural Egypt.

An experiment was done in which simple borehole latrines were installed in the homes of 3,000 villagers. Another 3,000 villagers did not receive the latrines and were observed as controls. The study was continued for five years. No difference in the prevalence of schistosomiasis was seen between the two groups at anytime during the project. The scientists did notice that the borehole latrines were being used by many of the villagers.

This was a very discouraging result. Many workers in schistosomiasis felt that this was a health education issue and that provision of sanitation alone would not generate enough sanitary compliance from the villagers to make a difference. Though many fewer villagers were urinating and defecating in the irrigation canals, enough were still doing so to continue the high levels of infection.

Only five other scientific investigations of sanitation have been attempted – one each in Brazil, Puerto Rico and St. Lucia (in the Caribbean) and two in Egypt. The results from Brazil, Puerto Rico and St. Lucia showed no difference in schistosomiasis occurrence between those with or without sanitation.

The two studies from Egypt, completed in the 1960's and 1970's found a two-fold difference. Villagers who did not have latrines had twice the prevalence of schistosomiasis compared with villagers who did have latrines. Even though these two studies had certain advantages or strengths, one of the studies had an unusual finding. Among the villagers who had latrines and did not use them, there was a six-fold decrease in schistosomiasis.

Three additional studies – in Brazil, the Philippines and St. Lucia – assessed sanitation as a method to prevent snails from becoming infected (with *miracidium*). All three studies reported a decrease of infection in the snails. Even so, schistosomiasis prevalence in the villagers did not significantly change.

Conclusions: Based on these few studies, we can say that improved sanitation *may* reduce the prevalence of schistosomiasis. At best, this would be a two-fold reduction. However, the results are confusing and not widely accepted. Because these results are incomplete and unconvincing, it is not possible to make estimates on the impact of IDWSSD sanitary improvements on schistosomiasis.

More work needed

These findings are strikingly different from what is expected, given our biological knowledge of schistosomiasis, probably due to the investigational methods that have been used. There is in fact a very good chance that sanitation does impact on schistosomiasis, but it remains to be identified and measured. This will be one of the challenges for the 1990's.

The evidence: Community water supplies

There have been 18 published reports of scientific investigations which measured the impact of various different types of community water supplies on schistosomiasis. Six of these reports are from St. Lucia. (The St. Lucia studies were the most comprehensive investigations on schistosomiasis carried out to date). Studies carried out in other countries include Egypt, Sudan, Brazil, the Republic of South Africa, Puerto Rico and Zimbabwe.

The underlying assumption is that improved water supplies will reduce contact with contaminated surface waters. That is, improved water supplies should minimize the need for the village family to bath or wash in surface waters or to have to collect water from contaminated sources for use in the home.

The studies included different types of water supply improvements, such as household water supply connections (the most expensive), community standpipes, handpumps and wells. They used different methods to show the impact of improved water supplies in the different countries. Details of the studies are shown in the Annex in Tables 1 to 6. Notes have been prepared for each table to assist in their interpretation.

Consistent success

Regardless of the methods used or in what country the investigation was carried out, *S. haematobium* and *S. mansoni* were consistently less prevalent among villagers who had improved water supplies. There was a wide range of observations, however. One study reported more than a six-fold difference in schistosomiasis between those with and without improved water supplies. Another study showed no difference. The evidence from different countries and different study methods is consistently and overwhelmingly in favor of a reduction in schistosomiasis with improved water supplies.

On average there was approximately a 40% lower occurrence of schistosomiasis between those with and without improved water supplies. The improved water supply impact was slightly greater on *S. mansoni* than on *S. haematobium* occurrence.

This analysis also provides a way of predicting the percentage of *S. haematobium* or *S. mansoni* that would be prevented by water supply improvements. About 10% of those with *S. haematobium* and about 20% of those with *S. mansoni* infections would be prevented by installing public standpipes. A much higher percentage of schistosomiasis would be prevented if household connections were installed.

Analysis also showed that improved water supplies would have greatest impact in areas where schistosomiasis prevalence is very high (the estimates above are averaged over a range of prevalence in different communities).

A village handpump is one way of breaking the infection cycle.

Water supply location or availability within the community, for example how many public standpipes are installed and their location, is also an important factor in reducing contact and infection. Household connections seem to provide more benefit than community standpipes. There are situations, however, in which villages with community water supplies have had substantial reductions in prevalence. Household connections in these settings would probably have little additional impact.

A greater reduction will be achieved when improved water supplies can be designed that will reduce recreational contact with surface waters, for example children swimming in irrigation canals, and reduce contact due to irrigating crops.

18.4 million reduction

In summary, based on the data available, there has been a 10% reduction in the global estimated number of persons with schistosomiasis. Potentially, 18.4 million persons would be prevented from being infected with schistosomiasis. This may be an under estimate for *S. mansoni*, where 20% of the these infections may be prevented by improved water supplies. Depending on the prevalence of schistosomiasis and the percentage of those without household connections in a given community, the results indicate that a much larger impact can be expected.

Impact assessment

Conclusions: There is a reproducible scientific observation that improvements in water supply have reduced and will continue to reduce *S. haematobium* and *S. mansoni* occurrence. Reasonable estimates have been calculated that can be used to assess the impact of improved community water supplies. The estimated impacts can be used to justify constructing improved water supplies in terms of public health and in terms of return on investment. The return on investment will include a reduction in costs needed for treatment, cost of control and the increase in productivity that will result from reducing schistosomiasis.

Moreover, the impact of water supplies on schistosomiasis justifies targeting water supply improvements in those communities where schistosomiasis prevalence is highest. This will increase the cost benefits and cost efficiency of investments in water supply improvements.

Actions: These are some of examples of ongoing programs to prevent schistosomiasis by improving community water supplies and sanitation.

Laundry platforms

The International Development Research Center (IDRC) of Canada is pursuing the prevention of schistosomiasis in **Zimbabwe** by improving community water supplies that include community laundry platforms for women to wash clothes and improved sanitation. These inputs are being integrated in a health education program directed at both adults and children.

Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) is encouraging communities to build central standpipes before treatment programs begin in **Mali, Malawi** and the **Congo**. The Swedish International Development Agency is working in **Botswana** on the prevention of schistosomiasis by improving water supplies and sanitation.

In **Zanzibar**, pilot programs have been undertaken by the UNDP/World Bank/WHO Special Program for Research and Training in Tropical Diseases which have succeeded in motivating the community to build wells with their own resources. A 'schistosomiasis agent', a person from the community, has been crucial in promoting these activities.

Schisto agent

In **Brazil**, the allocation of water supplies in the north-east, where schistosomiasis is endemic, is now carried out according to criteria established in cooperation with the Ministry of Health.

4. Recommendations

A number of challenges remain to be tackled in the 1990's.

It is important to bring to the attention of the appropriate agency decision makers, specifically those from public health and public works, that improving water supplies and probably sanitation is an important measure to be included in any schistosomiasis control program. A significant amount of schistosomiasis can be prevented by these investments.

It is now possible to use schistosomiasis as a public health indicator for water supply improvements in endemic regions. This can be done by measuring schistosomiasis before, during and after water supply improvements have been made. The World Health Organization has developed methods to minimize the time and cost of these measurements. The cost of these evaluation studies, relative to the investment for community water supply systems, is low.

To develop a more accurate picture of the impact of the Decade on schistosomiasis and follow this impact into the 1990's, data are needed:

- on the impact of sanitation on schistosomiasis;
- on the impact of combined water supply and sanitation on schistosomiasis;
- on the impact of improved water quality on schistosomiasis;
- on the impact of availability of improve public water supplies and the per capita consumption on schistosomiasis;

- on the impact of improved water supplies on subgroups of the endemic population, for example women and children;
- on improved water supplies and reduced contact with contaminated surface waters; and
- on the impact of water supply improvements and sanitation on schistosomiasis in specific countries and regions.

Remember

The threat of schistosomiasis will remain until measures to prevent transmission can be established. Moreover, it cannot be expected that the transmission of schistosomiasis will stop in the absence of reasonable access to safe water supplies and sanitation.

Improving water supplies and sanitation is a justified approach for achieving this goal.

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ANNEX: Data from studies into the impact of improved water supplies on the prevalence of schistosomiasis

The following tables have been prepared to provide the more experienced reader with the scientific data that was used in this report. An analytical method was used to evaluate the different reports and calculate combined estimates which can be used to determine the magnitude of impact by improved water supplies in the community. These estimates are referred to as "relative risk (RR)" or the risk or likelihood that persons without water supplies will have schistosomiasis compared with those who do have improved water supplies. Since some studies included data on limited age groups, such as ages 1 to 14, age adjustments of RR were made.

The specific procedure is called "meta-analysis". Details on how to use this method have been published by S. Greenland in Epidemiologic Reviews, Vol. 9, page 1; 1987.

The tables are organized according to how each study was set up or designed. Additional notes are attached to each table.

Table 1: Two studies on *S. mansoni* and household water supplies in St Lucia

Author (Year)	Water Supply	Species	Relative Risk (RR)	Adjusted* RR	Standard Error
Jordan 1975	House Connections	*Schistosoma Mansoni*	2.55 (1972-73)	2.34	0.084
Jordan 1985	House Connections	*Schistosoma Mansoni*	1.5 (1972-75)	1.4	0.058

* *Adjusted for age*

The results in this table are from a long term (15 years) comprehensive investigation on the control of *S. mansoni* in St. Lucia, in the Caribbean. The project is widely recognized as a model investigation. It evaluated the impact of household connections on the acquisition of new infections. The mean relative risk is 1.87 which indicates an 87% reduction in disease incidence among those who have the household connections. The two studies are statistically heterogeneous, which suggests that the effect of water supply is greater when endemicity is greater.

See the monograph by P. Jordan cited in the references for more detail.

Table 2: Cross-sectional studies comparing *S. haematobium* and *S. mansoni* with water supply improvements in five countries

Author (Year)	Water Supply	Species	Age adjusted Relative Risk	Standard Error
Greany 1952	Wells	*S. haemotobium* *S. mansoni*	1.8†	inadequate data presentation
Pitchford 1958*	Standposts	*S. haemotobium* *S. mansoni*	0.91 6.81	0.019 0.089
Farooq 1966	Standposts	*S. haemotobium* *S. mansoni*	1.38 1.97	0.019 0.019
Miller (Nile Delta) 1978	House Connections	*S. haemotobium* *S. mansoni*	2.51 3.75	0.072 0.102
Miller (Nile Delta) 1978	Standposts	*S. haemotobium* *S. mansoni*	1.74 2.01	0.057 0.071
Miller (Middle Egypt) 1978	House Conns & Standposts	*S. haemotobium* *S. mansoni*	4.03 1.71	0.357 0.123
Jordan 1975‡	House Connections	*S. mansoni*	1.37	0.025
Jordan 1978	House Connections	*S. mansoni*	1.25	0.018
Costa 1987	House Connections	*S. mansoni*	1.02	0.012

** Comparison was between villages with piped water supplies and latrines and those without either*

‡ Study included sanitation and health education

† approximate figure – inadequate data presentation

These studies were completed in the Sudan (Greany), Republic of South Africa (Pitchford), Egypt (Farooq and Miller), St. Lucia (Jordan) and Brazil (Costa). In each of these studies schistosomiasis and water supplies were measured at the same time in one or more communities or villages. In general those persons with improved water supplies had lower occurrences of infection. All studies except for *S. haematobium* in Pitchford's report, showed a positive impact ranging from 1.02 to 6.81. In areas with both *S. haematobium* and *S. mansoni*, improved water supplies had a greater positive effect on *S. mansoni*. Overall there was a 40% greater chance of being infected if there was an improved water supply.

Table 3: Before and after studies of water supply improvements and *S. haematobium* and *S. mansoni*

Author (Year)	Country	Species	Population	Years study	Age adjusted Relative risk	Standard Error
Barbosa 1971	Brazil	*S. mansoni*	497	7	6.70	0.113
Pitchford 1966	South Africa	*S. haematobium* *S. mansoni*	909	6	1.25 0.67	0.019 0.010
Pitchford 1970	South Africa	*S. haematobium* *S. mansoni*	1,511	9	1.48 1.08	0.022 0*
Jordan 1985	St Lucia	*S. mansoni*	1,882	11	5.76	0.038

** A weight of zero is given to studies that are statistically insignificant*

These studies were done by measuring schistosomiasis infection before improving the water supplies and then after the improvements had been made. Again, positive impacts were seen after the water supplies had been improved except for *S. mansoni* infection in South Africa.

Table 4: The impact of water supplies on reducing contact with contaminated water

Author (Year)	Country	Species	Population	Reduction*
Jordan 1985	St Lucia	*S. mansoni*	1,032	82.4% (N) 92.6% (D)
Costa 1987	Brazil	*S. mansoni*	1,208	25.7% (G) 96.8% (D)

* *N = reduction in the number of water contacts*
D = reduction in the duration of water contacts
G = reduction in the geometric mean number of water contacts

These studies show the impact of improved water supplies on reducing contact with contaminated streams. Regardless of how water contact was measured, i.e. by the number of contacts or by the duration of contacts, reductions were consistently reported. These studies require project personnel to make observations in the village at the unprotected water supply sites, be it streams, canals, lake shores, etc.

Table 5: Non-traditional studies on water supplies and schistosomiasis

Author (Year)	Country	Species	Population	Relative Risk
Husting 1966	Zimbabwe	*S. haematobium* *S. mansoni*	200	inadequate data
Weir 1952	Egypt	*S. haematobium*	13,611	inadequate data
Taylor 1987*	Zimbabwe	Schistosomiasis	284	2.03

* *Results were significant for washing clothes, but not for drinking water. The outcome was knowledge of schistosome infection in the household.*

These studies are shown here out of a desire to record and list all known studies on water supplies and schistosomiasis. Each of these studies was quite atypical in the methods used and no conclusions can be drawn from them. For example, in the Zimbabwe study, schistosomiasis infection was determined by asking family members if there was anyone in their household who was infected. In all the previously cited studies, infection was determined directly by the examination of urine and stool for the characteristic schistosome eggs.

Table 6: Water supplies - ecologic studies

Author (Year)	Country	Species*	Study period	Relative Risk	Standard Error
Negron-Aponte & Jobin (1979)	Puerto Rico	*S. mansoni*	1963-76	8.1	0.228
Bhajan 1978	Puerto Rico	*S. mansoni*	1960-70	3.6	0.109

* *Based on skin tests calibrated to stool examinations*

These were two similar studies completed in Puerto Rico during different time periods. They were ideal for evaluating the impact of improved water supplies, in this case household connections. Data from 8 and 24 communities, respectively, were collected. An overall estimate for schistosomiasis and for household water supplies was made separately for each community. Regression analysis was used to demonstrate the relationship between the water supply and schistosomiasis infection. From the result of the regression, relative risk can be estimated. There was on the average a 4.44 fold reduction in risk of schistosomiasis in those who had the household supplies. This same method can be used to evaluate the impact of water supply improvements among many communities in a district or state, and countries in a region. It can use data that is routinely generated by local agencies.

This document is one of a series of booklets prepared on behalf of the Steering Committee for Cooperative Action for the International Drinking Water Supply and Sanitation Decade. Titles in the series are:

1. **Report on IDWSSD impact on Diarrheal Disease**
2. **The IDWSSD and Women's Involvement**
3. **Human Resources Development in the IDWSSD**
4. **IDWSSD activities in Technical Information Exchange**
5. **Report on IDWSSD impact on Dracunculiasis**
6. **Report on IDWSSD impact on Schistosomiasis**

Copies of the documents are available from the CWS Unit, World Health Organization, 1211 Geneva 27, Switzerland.