Global situation of schistosomiasis: epidemiology and control, results and impact, gaps and challenges, New Roadmap targets and perspective

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NTD/WHO

World Health Organization
Schistosomiasis

- 78 Endemic countries
- 52 countries needing Preventive Chemotherapy
- 206.4 Million people in need of preventive Chemotherapy (91.4% located in Africa)
- 54% are SAC

<table>
<thead>
<tr>
<th>Vision</th>
<th>A world free of schistosomiasis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goals</td>
<td>To control morbidity due to schistosomiasis by 2020</td>
</tr>
<tr>
<td></td>
<td>To eliminate schistosomiasis as a public-health problem by 2025</td>
</tr>
<tr>
<td></td>
<td>To interrupt transmission of schistosomiasis in the Region of the Americas, the Eastern Mediterranean Region, the European Region, the South-East Asia Region and the Western Pacific Region, and in selected countries of the African Region by 2025</td>
</tr>
<tr>
<td>Objectives</td>
<td>To scale up control and elimination activities in all endemic countries;</td>
</tr>
<tr>
<td></td>
<td>To ensure an adequate supply of praziquantel and resources to meet the demand</td>
</tr>
</tbody>
</table>
### Current status of countries in 2019

52 countries requiring Preventive chemotherapy

<table>
<thead>
<tr>
<th>Status unknown</th>
<th>MDA not started</th>
<th>MDA started but not at scale or irregular</th>
<th>MDA scaled to all endemic IUs</th>
<th>Need evaluation to verify interruption of transmission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Djibouti, Lebanon, India, Thailand, Malaysia, Turkey, Libya, Myanmar</td>
<td>Equatorial Guinea, South Africa, Angola, Brazil, Congo, Nigeria, Philippines, Somalia, Central African Republic, Chad, Gabon, Guinea-Bissau, Sao Tome and Principe, South Sudan, Venezuela (Bolivarian Republic of), Zambia, Botswana, Namibia</td>
<td>Benin, Burkina Faso, Burundi, Cambodia, Cameroon, China, Côte d'Ivoire, Democratic Republic of the Congo, Eritrea, Ethiopia, Egypt, Gambia, Ghana, Guinea, Indonesia, Kenya, Liberia, Lao People's Democratic Republic, Madagascar, Malawi, Mali, Mauritania, Mozambique, Niger, Rwanda, Senegal, Sierra Leone, Sudan, Swaziland, Togo, United Republic of Tanzania, Uganda, Yemen, Zimbabwe</td>
<td>Algeria, Mauritius, Iran, Iraq, Jordan, Oman, Tunisia, Morocco, Syria, Saint Lucia, Surinam, Antigua and Barbuda, Dominican rep., Puerto Rico, Guadeloupe, Martinique, Montserrat, Saudi Arabia,</td>
<td></td>
</tr>
<tr>
<td>2 (4%)</td>
<td>16 (31%)</td>
<td>34 (65%)</td>
<td>18</td>
<td></td>
</tr>
</tbody>
</table>

78 countries are endemic for schistosomiasis + 1 Myanmar TBC
Global status of preventive chemotherapy in 2017 – schistosomiasis

<table>
<thead>
<tr>
<th>PC Implementation</th>
<th>AFR SAC/Adults</th>
<th>AMR SAC</th>
<th>EMR SAC/Adults</th>
<th>SEAR SAC/Adults</th>
<th>WPR SAC/Adults</th>
<th>GLOBAL SAC/Adults</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of countries requiring PC¹</td>
<td>41</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>4</td>
<td>52</td>
</tr>
<tr>
<td>Number of people requiring PC</td>
<td>108.2M/90.6M</td>
<td>1.6M</td>
<td>9.8M/6.7M</td>
<td>4K/18K</td>
<td>0.6M/2.2M</td>
<td>120.7M/100.1M</td>
</tr>
<tr>
<td>Number of countries implemented and reported²</td>
<td>31/15</td>
<td>1/1</td>
<td>4/4</td>
<td>1/1</td>
<td>3/3</td>
<td>40/24</td>
</tr>
<tr>
<td>Proportion (%) of districts implemented PC³</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proportion (%) of districts achieving effective coverage⁴</td>
<td>83.8</td>
<td>0</td>
<td>67.1</td>
<td>0</td>
<td>53.3</td>
<td>82.6</td>
</tr>
<tr>
<td>Number of people treated</td>
<td>78.6M/12.1M</td>
<td>0.1K/3.2K</td>
<td>6.4M/3.4M</td>
<td>1K/5K</td>
<td>0.4M/1.3M</td>
<td>85.4M/16.9M</td>
</tr>
<tr>
<td>Coverage (%)⁵</td>
<td>72.4/13.3</td>
<td>0.2</td>
<td>64.7/49.7</td>
<td>26.8/28.3</td>
<td>66.6/61.4</td>
<td>70.8/16.8</td>
</tr>
</tbody>
</table>

¹ Number of endemic countries moved to post-treatment surveillance stage is not included in total.
² Number of countries reporting data on PC implementation. Countries submitting blank reports are not included in total.
³ Proportion of known endemic districts implementing PC for SAC in countries that reported on PC interventions.
⁴ Proportion of districts implementing PC achieving the defined effective coverage of SAC population for the disease - ≥75% for SCH.
⁵ Coverage is calculated as the number of people in need of PC and treated out of total population requiring PC.

Regional coverage is calculated starting from 2010 when new country estimates by age group were published.

AFR – African Region; AMR – Region of the Americas; EMR – Eastern Mediterranean Region; SEAR – South-East Asia Region; WPR – Western Pacific Region

Source: WHO/NTD
Schistosomiasis: burden of disease and PC interventions - 2017

• Approximately 121 millions of children of school age (SAC) and 100 millions of adults live in areas requiring mass treatment for schistosomiasis, of which 108 and 91 millions, respectively, in the WHO African region (90% of the total).

• At global level, 85.4 million of SAC and 16.9 millions of adults were treated in 2017 (total 102.3 million, coverage=70.8% in SAC and 16.8% in adults). In the African region the coverage of SAC treatment is even higher, 72.4%.
# Recommended strategy for controlling toward elimination schistosomiasis

<table>
<thead>
<tr>
<th>Category</th>
<th>Baseline prevalence among school-age children</th>
<th>Action to be taken</th>
<th>Additional interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-risk community</td>
<td>≥ 50% by parasitological methods (intestinal and urogenital schistosomiasis) or ≥ 30% if based on questionnaires for history of haematuria</td>
<td>Treat all school-age children (enrolled and not enrolled) once a year</td>
<td>Water, sanitation improve, hygiene education (WASH) snail control</td>
</tr>
<tr>
<td>Moderate-risk community</td>
<td>≥10% but &lt;50% by parasitological methods (intestinal and urogenital schistosomiasis) Or &lt;30% by questionnaire for history of haematuria</td>
<td>Treat all school-age children (enrolled and not enrolled) once every 2 years (essentially treat 50% of this age group each year)</td>
<td>Water, sanitation and hygiene education (WASH) snail control</td>
</tr>
<tr>
<td>Low-risk community</td>
<td>&lt;10% by parasitological methods (intestinal and urogenital schistosomiasis)</td>
<td>Treat all school-age children (enrolled and not enrolled) twice during their primary schooling age (treat at least 33% of this age group each year)</td>
<td>Water, sanitation and hygiene education (WASH) snail control</td>
</tr>
</tbody>
</table>
**At risk groups for schistosomiasis**

- School-age children (Primary and secondary schools / in community)
- Preschool-age children
- Adults considered to be at risk, from special groups (pregnant and lactating women; groups with occupations involving contact with infested water, such as fishermen, farmers, irrigation workers, or women in their domestic tasks)
- Entire community in high endemic areas

What research is needed to expand coverage to these groups?
Progression towards elimination

1. Countries aiming for control of morbidity
   - Prevalence of heavy-intensity infection <5% in all sentinel and spot check sites
   - Preventive chemotherapy
   - Complementary public health interventions, where possible
   - 100% geographical coverage and at least 75% national coverage
   - Variable depends on transmission and coverage

2. Countries aiming for elimination as a public problem control activities
   - Prevalence of heavy-intensity infection <1% in all sentinel sites and spot check sites
   - Adjusted preventive chemotherapy
   - Complementary public health interventions essential
   - Variable

3. Countries aiming for interruption of transmission (elimination)
   - Reduction of incidence of infection to zero
   - Intensified preventive chemotherapy in residual foci
   - Complementary public health interventions essential, implementation of a robust surveillance system
   - Reduction of incidence of infection to zero

4. Countries interrupting transmission (elimination)
   - Incidence of infection remains zero (no autochthonous cases)
   - Surveillance to detect and respond to resurgence of transmission and to prevent reintroduction (schistosomiasis should be made notifiable)
   - Continues until verification

Group progression (1 to 4)
Snail control for the interruption of the transmission of schistosomiasis

- Chemotherapy alone rarely stops transmission of the parasite and additional interventions must be implemented to reduce reinfection, lower prevalence and move towards elimination.
- Resolution WHA 65.21 on the elimination of schistosomiasis, recognized the progress made in some countries and the potential for the interruption of transmission in others.
- Resolution WHA70.16 on Global control response and strategic plan 2020-2030 aimed to reduce mortality and case incidence of vector borne diseases (including schistosomiasis).
- Niclosamide is the only WHO approved molluscicides.
Female genital schistosomiasis (FGS)

- New focus on female genital schistosomiasis (FGS)

Call for action:
- Increased advocacy for treatment of FGS among adolescent girls and women, and more praziquantel to prevent FGS
- Integration of schistosomiasis treatment in HIV prevention package. Use existing health-care delivery systems as a platform to expand FGS prevention, screening and treatment.
- More research to provide evidence and impact of Schistosomiasis preventive chemotherapy on HIV and FGS prevention

- PC with PZQ for SAC to prevent lesions
- PC with PZQ for WRA to prevent and treat lesions
For women and girls who present with urogenital symptoms and who have had contact with fresh water in countries endemic for schistosomiasis, the diagnosis of female genital schistosomiasis (FGS) must be considered.

FGS is diagnosed by visual inspection of characteristic lesions on the cervix and vaginal wall. Visualisation can be improved by using a digital camera or a colposcope.

Current laboratory techniques are inadequate for diagnosing FGS. If one FGS case is seen, there are probably many others in the same area. All who have used the same source of water are at risk. It is especially important to identify children who may have early schistosomiasis.

The WHO recommended treatment for schistosomiasis is PRIDIOXAMINE 40 MG/AC TO A SINGLE DOSE.

Regular treatment with pridoxamine during preventive chemotherapy activities (mass drug administration) to communities and schools in endemic areas is an important public health intervention against FGS. Diagnosis is determined by measuring height using a device pole.

Treatment kills the adult worms and prevents new FGS lesions.

For further information and examples on FGS, please refer to the WHO Female Genital Schistosomiasis Pocket Atlas (2011).
Challenge I
the biggest gap for praziquantel

- Approximately 121 millions of children of school age (SAC) et 100 millions of adults live in areas requiring mass treatment for schistosomiasis- Total 221 Million people

- The amount of praziquantel needed is 603 Million tablets/year to treat SAC and Adults in need of PC

- Merck has made available 250 Million tablets/year for SAC in priority

- Pre-SAC are not include in PC due to the lack of suitable pediatric formation of Praziquantel
Challenge II
Sustaining high coverage for MDA

- Praziquantel efficacy - 80-90% cure rate (40mg/kg)
- Eggs still discharged after chemotherapy – maintaining transmission
- Chemotherapy compliance decreased year by year, (low coverage)
- Praziquantel side effects (fear of treatment)
- Sustainability of funding
Challenge III
Snail control is limited

- Low capacity in malacology and snail control
- Need of more sensitive methods for determination positive snails
- Only one molluscicide is WHO approved (Niclosamide)
- High cost of snail control using molluscicides
- Little experience on impact of new molluscicides use on environment modification for aquatic snails
Challenge IV
Sensitive and specific diagnostic tests

- Morbidity control – prevalence of heavy infections
  – Kato-Katz technique
  – Urine filtration/haematuria

- Elimination as a public health problem
  – Kato-Katz technique – indicator is < 1% of heavy infections
  – Hatching test – sensitive enough to detect a few miracidia
  – Antibody tests – to identify hot-spots of transmission
  – Antigen and parasite DNA detection tests

- Interruption of transmission
  – Antibody/antigen detection tests for humans and reservoir hosts
  – Tests to detect parasite DNA in human and snail intermediate hosts
Criteria for elimination and interruption of transmission

- Due to the different species, it is not easy to uniform standards
- Alone the prevalence is not enough to show really situation
- Distance from areas with the disease determine the risk of resurgence
- Movement of Hosts determine the risk of resurgence-Migration
- Economic development impact the achievement
Research need on morbidity of schistosomiasis in PSAC and their treatment with PZQ

- Need to develop a safety database on the use of crushed PZQ in PSAC.
- Need to conduct different PZQ dose trials in preschool children.
- Need to expand the development and validation of POC diagnostics for PSAC.
- Need to develop a method and technology to identify the high risk areas.
- Need to conduct a multicentre study on the morbidity of schistosomiasis in PSAC using ultrasound and impact of PZQ in the reversal of lesions at different follow-up times.
Research on treatments of community

- Social science studies on reasons of non-integration of pregnant and lactating women in PC for schistosomiasis and STH
- Strategies to reach PSAC, pregnant and lactating women through maternal and child health services
- Need of studies on efficacy of PZQ in genital schistosomiasis
- Need of strategies for treatment of SAC in Secondary schools
- Need of studies on strategies to reach occupational groups such as fishermen, farmers, irrigation workers, car washers
Endpoint goal:
- Global Elimination of schistosomiasis as Public Health Problem
- Interruption of transmission of Schistosomiasis in selected countries

Justification:
- WHA65.21 calling for the elimination of schistosomiasis
- Impact of preventive chemotherapy in reducing the morbidity due to schistosomiasis
- Modelling of prevalence thresholds for preventive chemotherapy
Diseases targeted for elimination as a public health problem

Schistosomiasis

**Goal:** Elimination as a public health problem

**Criteria to measure the achievement of the goal:** Proportion of heavy intensity schistosomiasis infections <1%.

<table>
<thead>
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<th>2023</th>
<th>2025</th>
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<td>5</td>
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<td>38</td>
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Is there a WHA resolution supporting the goal? Yes

Is a WHO guideline for achievement of goal published? To be published soon

Link to WHO guideline(s)

Is there a WHO process for validation/verification/certification? To be published soon

Link to WHO validation/verification/certification process: Yes

Goal attainment probability (High/Medium/Low):

Risks/Assumptions (towards attaining stated goal as measured): High

Target considers model predictions: Lack of political commitment and resources, insecurity, lack of praziquantel for adults and preschool-age children, infection in animals.

Key collaborator for modelling: Yes

Link to WHO fact sheet: University of Ghana and Università di Perugia-Italy
Diseases targeted for elimination as a public health problem

**Schistosomiasis**

**Goal:** Elimination as a public health problem

**Criteria to measure the achievement of the goal:** Interrupt transmission in selected countries: zero autochtonous infections in humans, snails and animals for at least 5 consecutive years in a previously endemic country.

<table>
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<tr>
<th>Milestone</th>
<th>Impact Indicator</th>
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<th>2023</th>
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**Is there a WHO process for validation/verification/certification?** To be published soon

**Link to WHO validation/verification/certification process:** Yes

**Goal attainment probability (High/Medium/Low):**

**Risks/Assumptions (towards attaining stated goal as measured):** Medium

**Target considers model predictions:** Lack of political commitment and resources, insecurity, lack of praziquantel for adults and preschool-age children, infection in animals, transmission by hybrids

**Key collaborator for modelling:** Yes

**Link to WHO fact sheet:** [University of Ghana and Università di Perugia-Italy](#)
Progression of Countries and Territories toward elimination of SCH as public health problem of the 78 countries endemic for schistosomiasis - WHO, TRS 830

<table>
<thead>
<tr>
<th>2020</th>
<th>2023</th>
<th>2025</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. China</td>
<td>2. Brazil</td>
<td>2. Sudan</td>
<td>2. CAR</td>
</tr>
<tr>
<td>7. Indonesia</td>
<td>7. Lebanon</td>
<td>7. Chad</td>
<td>7. South Africa</td>
</tr>
</tbody>
</table>
## Progress of countries towards the target of interruption of transmission

<table>
<thead>
<tr>
<th>Indicator</th>
<th>2020</th>
<th>Milestone 2023 (end of GPW13)</th>
<th>Milestone 2025</th>
<th>Target 2030</th>
</tr>
</thead>
</table>
Thank you