



21 de octubre de 2014

Ana Clara Zoni and Laura Catalá



Pan American
Health
Organization

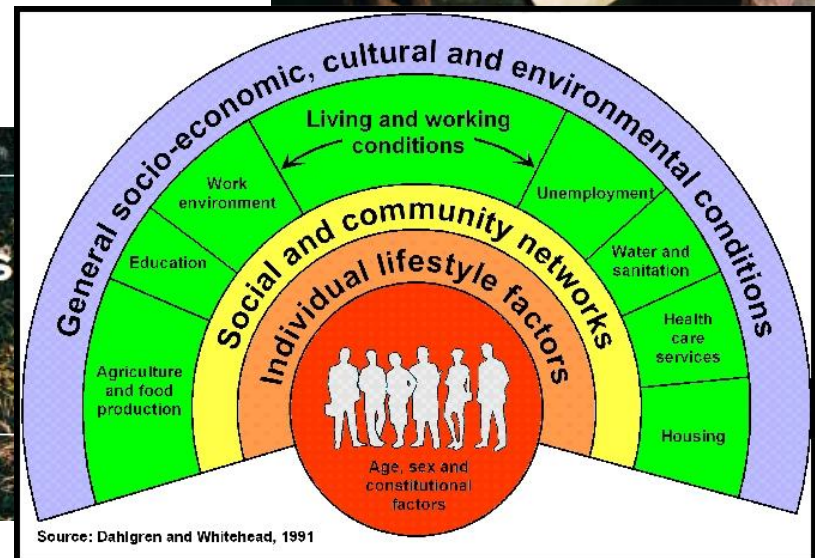
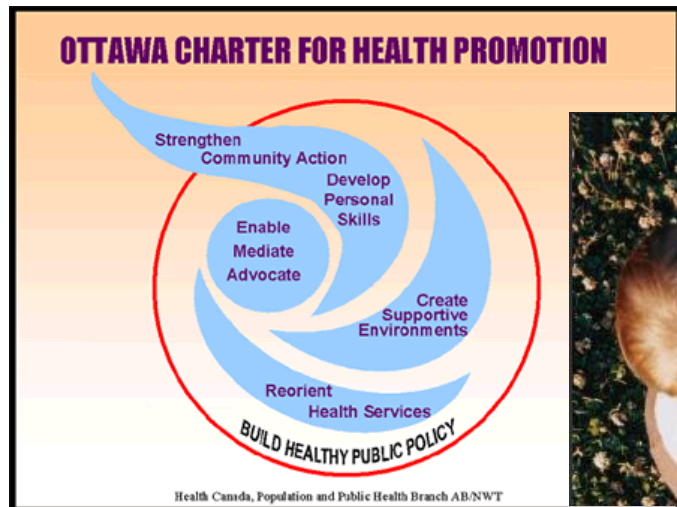
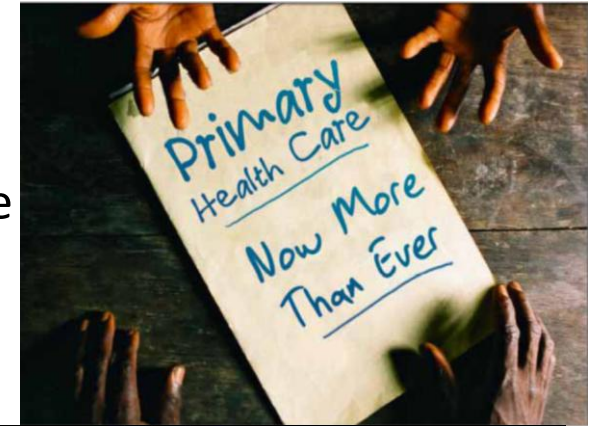


World Health
Organization
REGIONAL OFFICE FOR THE Americas

INTRODUCTION

Schistosomiasis:

- Water-borne parasitic disease
- Poor communities:
 - lack readily available potable water and adequate sanitation
 - limited access to healthcare
 - lack knowledge of risk factors for infection



MASS ADMINISTRATION OF THE ANTIPARASITIC PRAZIQUANTEL

OBJECTIVES

General

Determine prevalence and intensity of infection of *Schistosoma mansoni* in children among 1 to 19 year old in LAC at second (municipality) administrative levels and lower (locality or even neighborhood)



Specific

- To map the intensity of schistosomiasis infection in children from LAC
- To map the prevalence of *Schistosoma mansoni* in children from LAC
- To identify the gaps in the information with respect to both prevalence and intensity of infection for *Schistosoma mansoni* in LAC

METHODOLOGY

Study Design

Systematic Review of scientific literature

Sources of Information

- MEDLINE (PubMed)
- Embase
- LILACS (including SciELO)
- DARE (Database of Abstracts of Reviews of Effects)
- Cochrane Database of Systematic Reviews
- Institutional web pages (PAHO/WHO, Ministries of Health)
- Bibliographies of the studies included



Search Strategy

“Schistosomiasis” AND “child” AND («Epidemiology» OR «Parasitology» OR «statistics and numerical data») AND (a combination of the names of all countries, capitals, and main cities of LAC)

METHODOLOGY

Method of work

- PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) 2009
- Two reviewers

All citation

Reference Manager[®]

Full-text articles

Document files

Articles included: variables

Microsoft Excel[®]



Discussion
and
consensus

METHODOLOGY

Eligibility criteria

•Scope (administrative Level)

Second administrative level (municipality) or lower (locality or even neighborhood) from LAC

•Participants

Children (<19 years old) infected with *Schistosoma mansoni* from LAC

Age groups: PSAC (1-4 yo) and SAC (5-15 yo)

•Outcomes

-Prevalence (percentage)

Parasitological/ serological/ dermatological/ antigenemia in urine diagnostic test

-Intensity of infection (geometric or arithmetic mean)



Classes of intensity for schistosomes. WHO 2002

Light	Moderate	Severe
1-99 epg	100-399epg	>400 epg

•Studies Design

Clinical trials, systematic reviews and meta-analyses, cross sectional and observational

METHODOLOGY

Exclusion criteria

- Studies conducted in countries other than the LAC region
- Studies with sample size of less than 30 participants
- Studies involving adults (without the possibility of separately analyzing children)
- Studies involving parasite species but does not report data for *S. mansoni*
- Studies not published in an official language of the PAHO region
- Studies which calculated prevalence by using clinical diagnosis exclusively
- Studies which the universe is hospital based (the prevalence is not representative)
- Studies which data duplicated in another included article



METHODOLOGY

Variables

- Country
- Citation
- Year of publication
- Study Design
- Sample Year
- Location
- Prevalence and intensity of infection
- Type of diagnostic
- Test used
- Age group of participants

	A	B	C	D	E	F	G	H	I
1	ID	Title_File	Pub_Year	Sample year	CNTRY_NA ME	ADM2_NAME	LOC_NAME	Age_art	P1
2	39	BRA_1971_Barbosa	1971	1961	Brazil	Cabo de Santo Agostinho	Pontezinha	0-4	6,8
3	39	BRA_1971_Barbosa	1971	1961	Brazil	Cabo de Santo Agostinho	Pontezinha	5-14	40,6
4	39	BRA_1971_Barbosa	1971	1966	Brazil	Cabo de Santo Agostinho	Pontezinha	0-4	2,4
5	39	BRA_1971_Barbosa	1971	1966	Brazil	Cabo de Santo Agostinho	Pontezinha	5-14	15,2
6	74	BRA_2010_Pereira AP	2010	2003	Brazil	Chã de Alegria	Chã de Aldeia	0-5	0,0
7	74	BRA_2010_Pereira AP	2010	2003	Brazil	Chã de Alegria	Chã de Aldeia	6-15	10,5
8	74	BRA_2010_Pereira AP	2010	2003	Brazil	Chã de Alegria	Souto	0-5	0,0
9	74	BRA_2010_Pereira AP	2010	2003	Brazil	Chã de Alegria	Souto	6-15	26,3
10	74	BRA_2010_Pereira AP	2010	2003	Brazil	Chã de Alegria	Anil	6-15	9,5
11	74	BRA_2010_Pereira AP	2010	2003	Brazil	Chã de Alegria	Brasil	0-5	10,0
12	74	BRA_2010_Pereira AP	2010	2003	Brazil	Chã de Alegria	Brasil	6-15	18,4
13	74	BRA_2010_Pereira AP	2010	2003	Brazil	Chã de Alegria	Lagoinha	0-5	0,0
14	74	BRA_2010_Pereira AP	2010	2003	Brazil	Chã de Alegria	Lagoinha	6-15	9,3

METHODOLOGY

Data analysis

- Intensity of infection: WHO recommendations
- Prevalence were categorized as follows: <1%, ≥1-9%, ≥10-49%, and ≥50%

RECOMMENDED CONTROL STRATEGIES FOR SCHISTOSOMIASIS IN SCHOOL-AGE CHILDREN

Category	Prevalence of schistosomiasis among school-age children at baseline	Control strategy	
		Preventive chemotherapy	Additional interventions
Schools in high-risk areas	≥50% if based on parasitological methods <i>or</i> ≥30% if based on questionnaires for visible haematuria	Treat all school-age children (enrolled and non-enrolled) once a year	Improve sanitation and water supply Provide health education
Schools in moderate-risk areas	≥10% and <50% if based on parasitological methods <i>or</i> >1% and <30% if based on questionnaires for visible haematuria	Treat all school-age children (enrolled and non-enrolled) once every two years	Improve sanitation and water supply Provide health education
Schools in low-risk areas	≥1% and <10% if based on parasitological methods	Treat all school-age children (enrolled and non-enrolled) twice during their primary-school years (e.g. once on entry and once on exit)	Improve sanitation and water supply Provide health education

RESULTS

RESEARCH RESULTS

RESULTS

PRISMA 2009 flow Diagram



842 citation

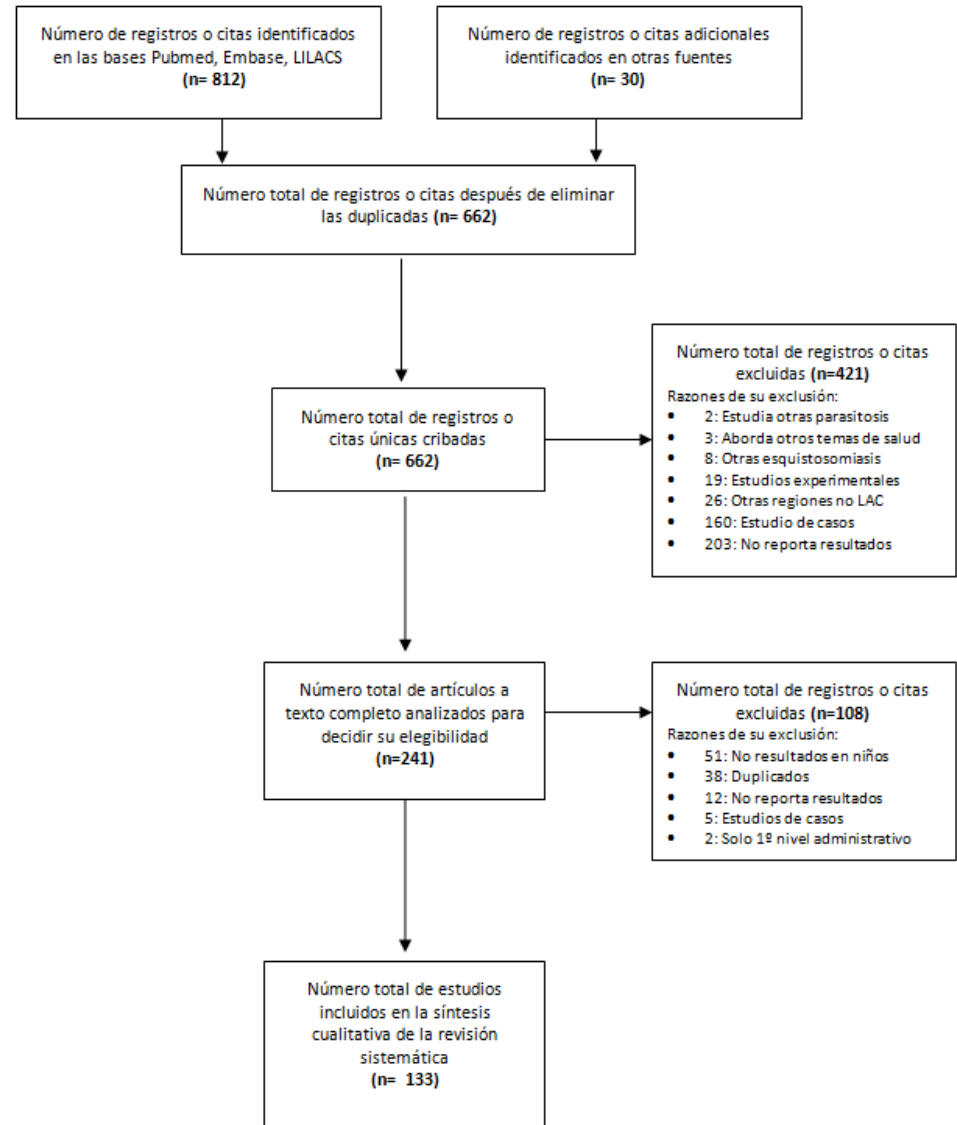
133 articles included

Identificación

Cribado

Elegibilidad

Incluidos



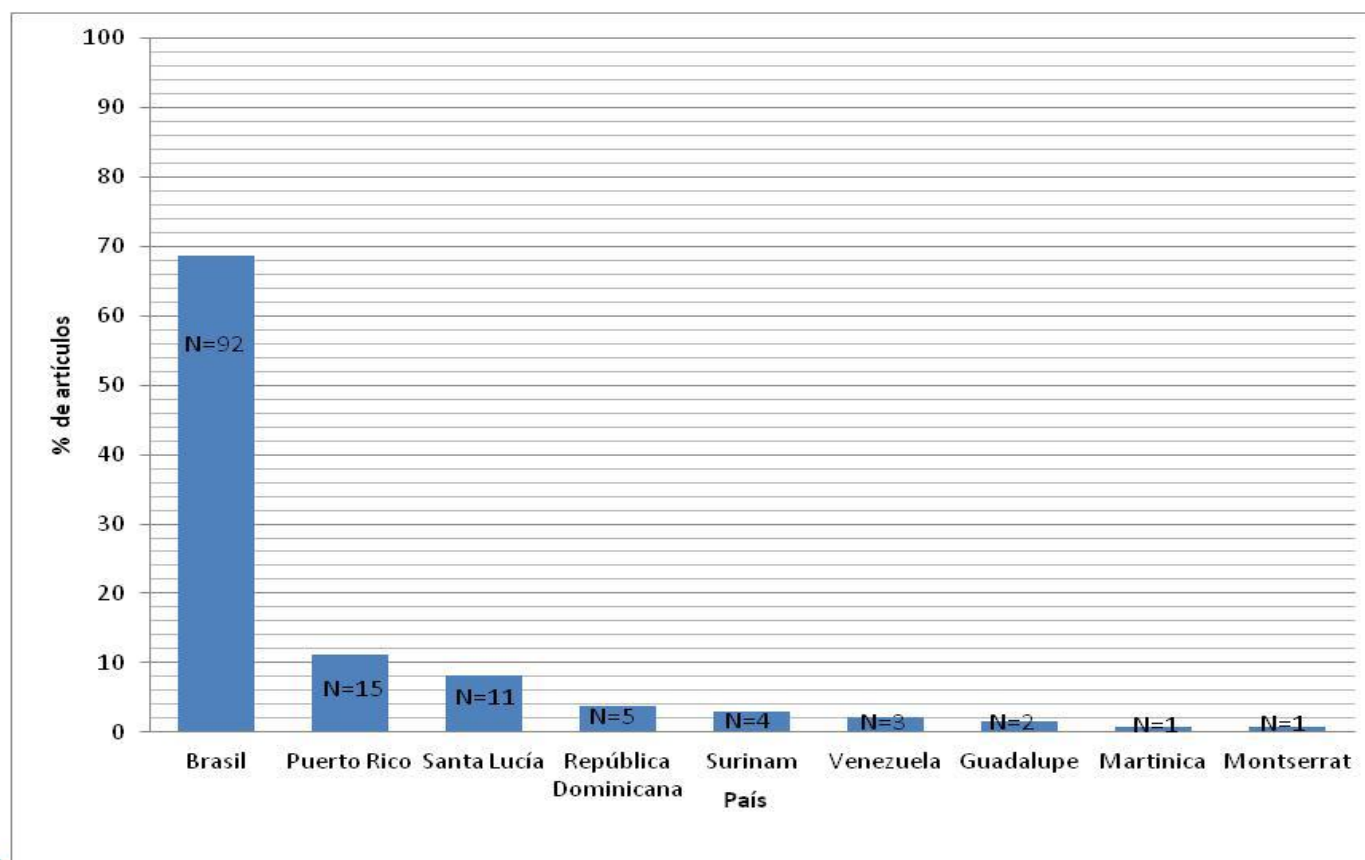
RESULTS

GLOBAL RESULTS

Main features of the
articles included

RESULTS

Percentage and number of articles with prevalence and intensity of schistosomiasis infection in children listed by country , 1942-2014 (N = 133)



RESULTS

Antigua y Barbuda
WHO 1987

Atlas of the global distribution of schistosomiasis

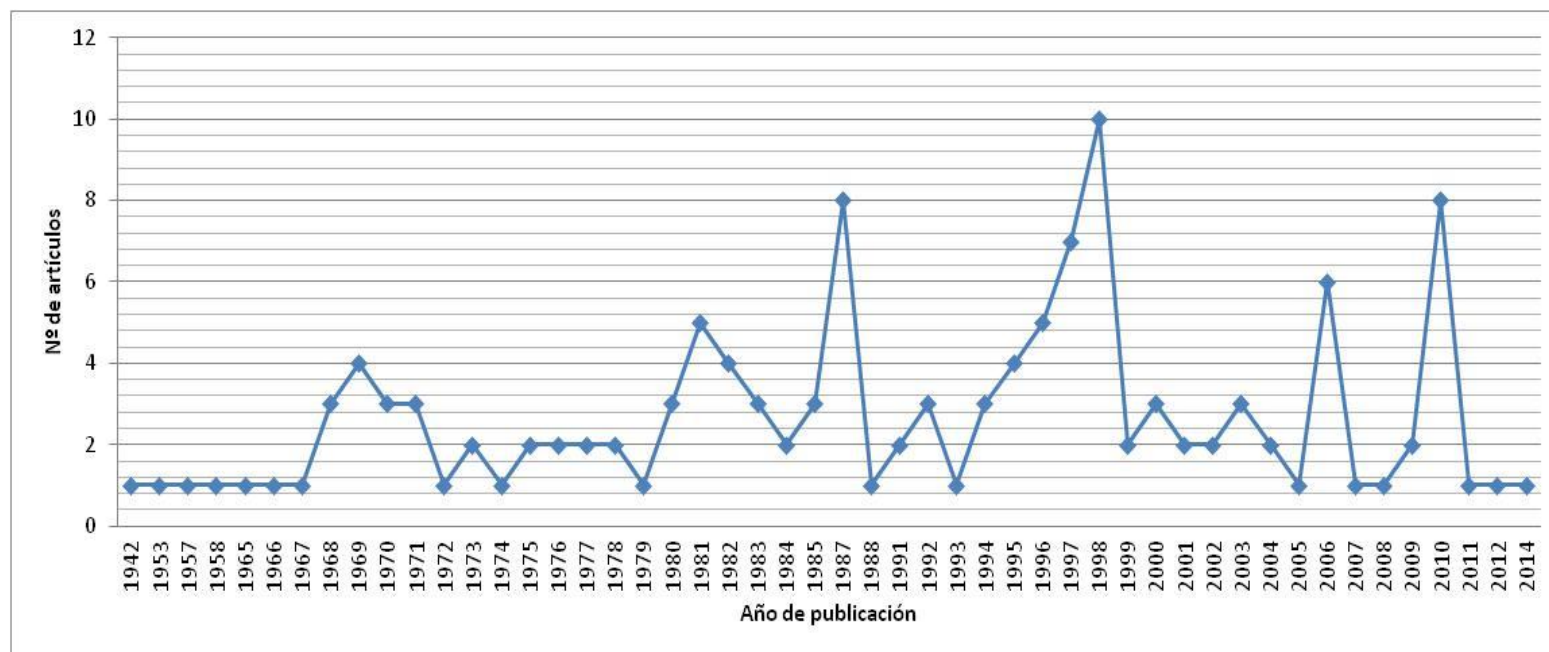
41 - SAINT LUCIA - ANTIGUA - MONTSERRAT

B — In Antigua and Montserrat :

In 1978, on the east coast of Montserrat the prevalence of *S. mansoni* infection was 14% at Trants and Farms, and reached 50% in the 15-24 year age group (29). In 1981, among 251 children 5-9 years of age from all the schools in the island no new case of schistosomiasis was observed. In 1982, TIKASINGH (personal communication) reported that the prevalence was 10% in three villages (Bethel, Bramble and Tuitts), situated near Trants and Farms. In 1982, in Antigua, in the John Hughes settlement, 17% of the population of the locality were infected with *S. mansoni*. On the other hand, no cases of schistosomiasis were found at Sweets, Liberta and Bendals, where they had occurred previously (10).

RESULTS

Annual trend of the number of article included on prevalence and intensity of schistosomiasis infection in children, 1942-2014 (N = 133)



Sample period: 1937-2010

RESULTS

Descriptive analysis of the main features of the articles included

Variable	Categories	N	%
Sample year	1937-1954	7	5,3
	1955-1969	19	14,3
	1970-1984	39	29,3
	1985-1999	47	35,3
	2000-2014	21	15,8
Type of Sample	Universal	20	15,0
	Random	25	18,8
	Not reported	88	66,2
Type of publication	Original	130	97,7
	WHO report	3	2,3
Language	French	1	0,8
	Spanish	2	1,5
	Portuguese	35	26,3
	English	95	71,4
Study Design	Clinical trials	1	0,8
	Quasi-experimental	2	1,5
	Case-control	5	3,8
	Cohort	6	4,5
	Cross sectional	119	89,5
Setting	School	46	34,6
	Community	87	65,4
Population area	Rural	76	57,1
	Urban	25	18,8
	Mixed population	27	20,3
	Rural and Urban in the same article	5	3,8

RESULTS

Descriptive analysis
of the main features
of the articles
included

Variables	Categories	N	%
Age Group	2 groups: PSAC and SAC	36	27,1
	Only SAC (complete group)	16	12,0
	SAC(subgroups)	40	30,1
	SAC (did not report the age)	5	3,8
	Total (0-15)	12	9,0
	Other clasification	24	18,0
Type of test	Coprologic	103	77,4
	Serologic	3	2,3
	Dermatologic	4	3,0
	Urine tes	0	0,0
	Combination of above mention	22	16,5
	Did not report	1	0,8
Gender Difference	No	8	6,0
	Yes	39	29,3
	Not analyzed	86	64,7
Intensity of Infection	Arithmetic mean	3	2,3
	Geometric mean	32	24,1
	WHO categories	2	1,5
	Geometric mean + WHO categories	1	0,8
	Geometric mean + Other classification	3	2,3
	Arithmetic mean + Other classification	1	0,8
	Other classification	1	0,8
	Did not report the method used	1	0,8
	Did not report	89	66,9
Intermediate hosts	<i>Biomphalaria glabrata</i>	37	27,8
	<i>Biomphalaria glabrata</i> + otras	13	9,8
	Others	17	12,8
	Did not report	66	49,6

RESULTS

PREVALENCE

RESULTS

Number and percentage of records with information on prevalence of schistosomiasis in children by age group and country, in the region of the Americas, 1942-2014

Country	Prevalence by age group				
	PSAC	SAC	TOTAL (1-15 yo)	Other classification	Total
	N (%)	N (%)	N (%)	N (%)	N (%)
Brazil	83 (11,4)	591 (81,3)	23 (3,2)	30 (4,1)	727 (100)
Guadeloupe	0 (0)	12 (92,3)	1 (7,7)	0 (0)	13 (100)
Martinica	0 (0)	12 (100,0)	0 (0)	0 (0)	12 (100)
Montserrat	2 (50,0)	2 (50,0)	0 (0)	0 (0)	4 (100)
Puerto Rico	29 (8,7)	301 (90,4)	3 (0,9)	0 (0)	333 (100)
Dominican Republic	1 (9,1)	9 (81,8)	0 (0)	1 (9,1)	11 (100)
Saint Lucia	38 (43,7)	38 (43,7)	11 (12,6)	0 (0)	87 (100)
Surinam	4 (33,3)	5 (41,7)	2 (16,7)	1 (8,3)	12 (100)
Venezuela	5 (11,1)	6 (13,3)	0 (0)	34 (75,6)	45 (100)
Total (N)	162 (13,0)	976 (78,5)	40 (3,2)	66 (5,3)	1244 (100)

RESULTS

INTENSITY OF INFECTION

RESULTS

Number and percentage of records with information about intensity of infection of schistosomiasis by age group and country, in the region of the Americas, 1942-2014 (44 articles)

Country	Intensity of infection by age group				
	PSAC	SAC	TOTAL (1-15 yo)	Other classification	Total
	N (%)	N (%)	N (%)	N (%)	N (%)
Brazil	22 (14,4)	107 (69,9)	13 (8,5)	11 (7,2)	153 (100)
Dominican Republic	1 (50,0)	1 (50,0)	-	-	2 (100)
Saint Lucia	20 (46,5)	20 (46,5)	3 (7,0)	-	43 (100)
Surinam	-	-	1 (100,0)	-	1 (100)
Total (N)	43 (21,6)	128 (64,3)	17 (8,5)	11 (5,5)	199 (100)

RESULTS

RESULTS BY COUNTRIES

RESULTS

Brasil

Nº of articles: 92

Sample year period: 1952-2010

1º administrative level: 11/27 States (Alagoas, Bahia, Espírito Santo, Maranhão, Minas Gerais, Paraíba, Pernambuco, Rio de Janeiro, Rio Grande do Norte, São Paulo, Sergipe)

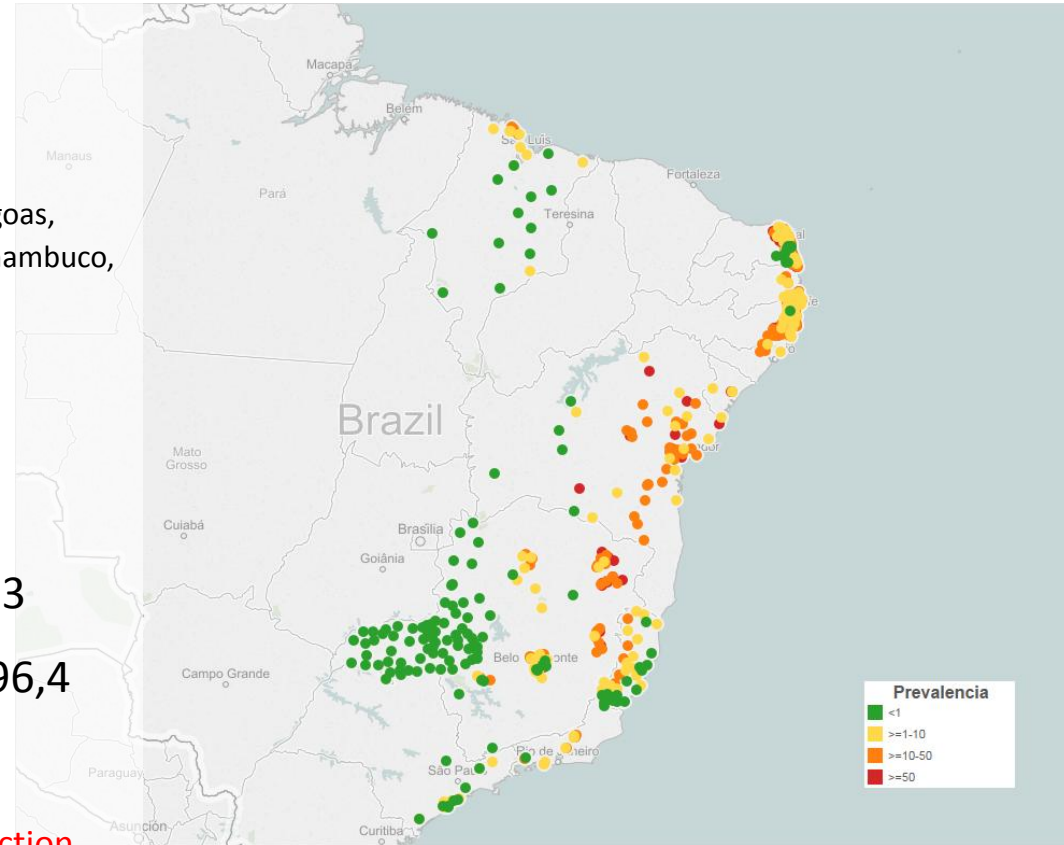
Nº of prevalence registries: 727

Highest prevalence: PSAC 62,5% (Minas Gerais) and SAC 94,6% (Pernambuco)

Nº of intensity of infection registries: 153

Highest level of intensity of infection: 796,4 epg in Minas Gerais

*It is the only country that reported intensity of infection according to WHO categories



RESULTS

Prevalence of schistosomiasis in children (1-15 yo) by Brazilian states. Epidemiological surveys 2000-2010 (N=102 registries)

State	Sample year	Registries (N)	Range (%)
Alagoas	2006-2008	2	20,9-27,7
Bahía	2004	1	30,2
	2009	1	44,4
Minas Gerais	2001	1	64,9
	2001-2002	1	48,9
	2001-2003	3	8,6
	2003	1	77,0
	2004	2	35,0- 53,0
	2005-2006	4	3,4-40,7
	2007	6	0,0-1,6
Pernambuco	2000	8	3,4- 55,3
	2003	17	0,0-26,3
	2004	46	2,6-48,7
	2006	2	45,0-48,0
	2006-2007	2	5,0-24,0
	2008-2009	2	4,2-34,2
	2010	1	20,5-20,5
São Paulo	2000	2	0,0-31,3
TOTAL	2000-2010	102	0,0-77,0

RESULTS

Guadalupe

Nº of articles: 2

Sample year period: 1969 -1973

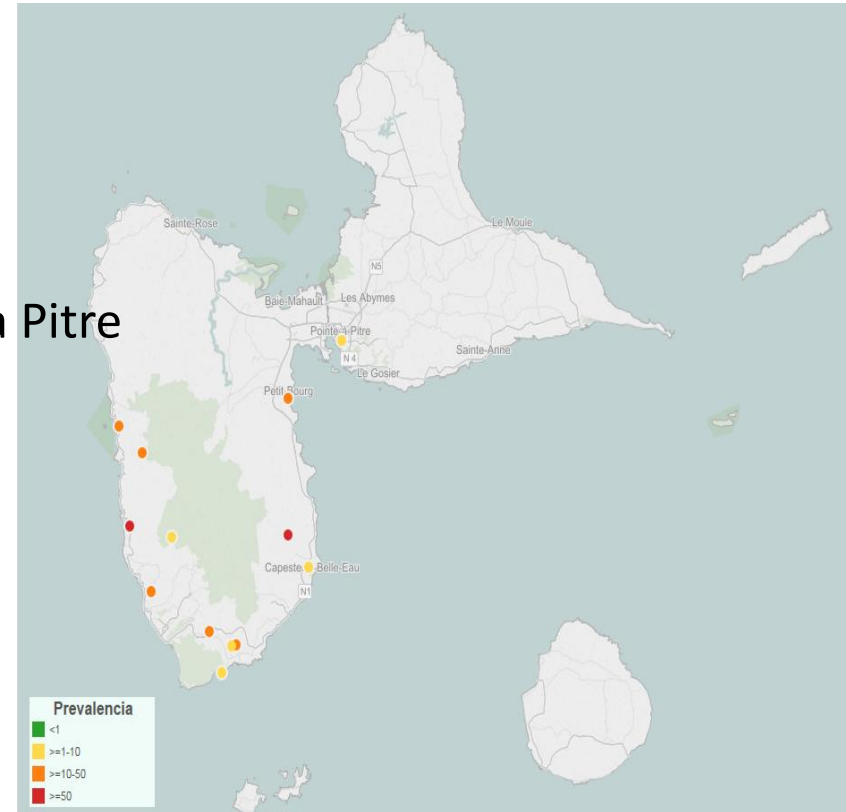
Administrative level: Basse Terre and Point a Pitre

Nº of prevalence registries: 13

Highest prevalence: 76,4% Basse Terre

Nº of intensity of infection registries: -

Highest level of intensity of infection: -



RESULTS

Martinique

Nº of articles: 1

Sample year period: 1970

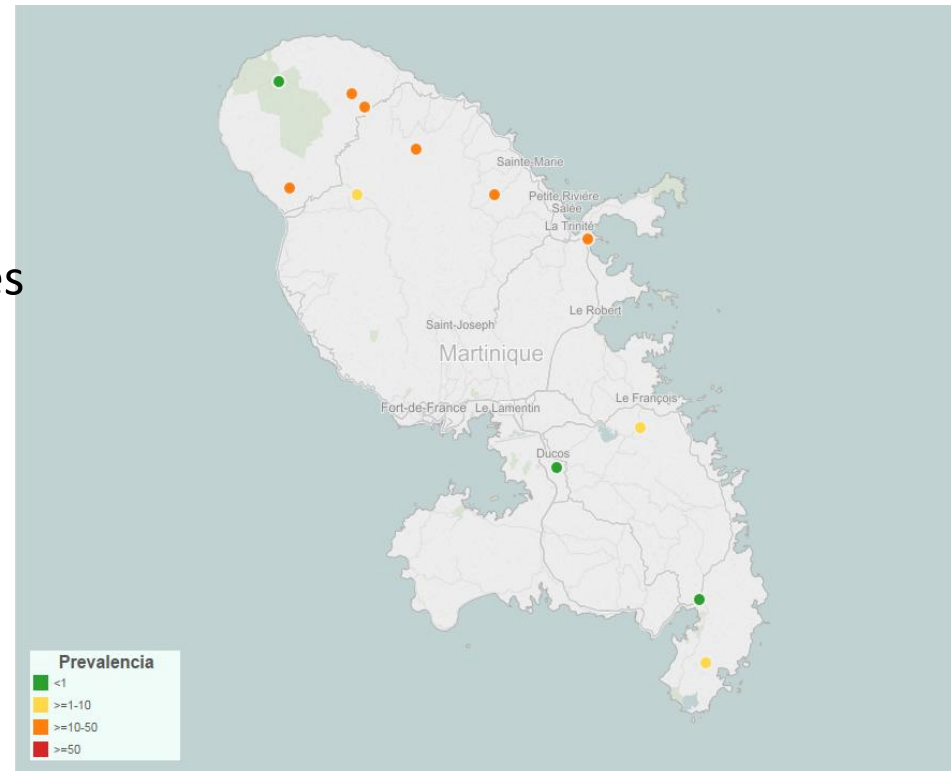
2º administrative level: 3/4 municipalities
(Le Marin, Sain-Pierre, Trinite)

Nº of prevalence registries: 12

Highest prevalence: 76,4% (Le Marin)

Nº of intensity of infection registries: -

Highest level of intensity of infection: -



RESULTS

Montserrat

Nº of articles: 1

Sample year period: 1978

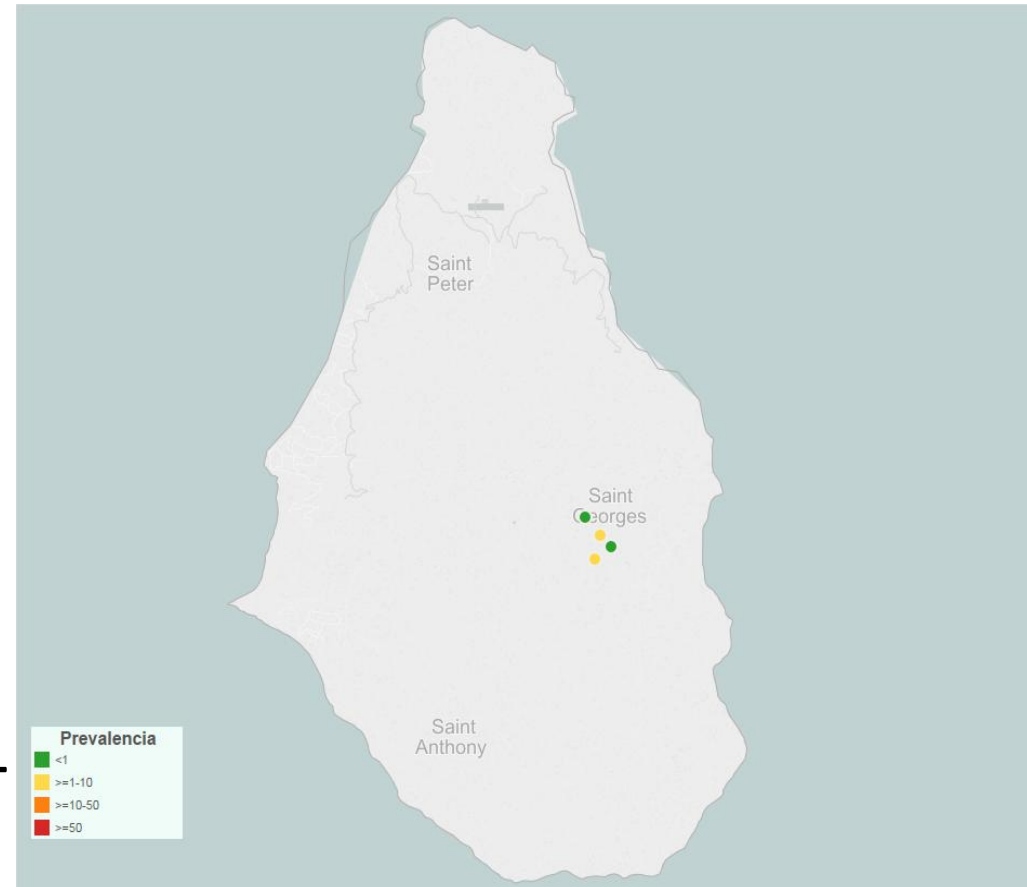
2º administrative level: 1/3 parishes

Nº of prevalence registries: 4

Highest prevalence: 5% Saint George

Nº of intensity of infection registries:-

Highest level of intensity of infection:-



RESULTS

Dominican Republic

Nº of articles: 5

Sample year period: 1951-1994

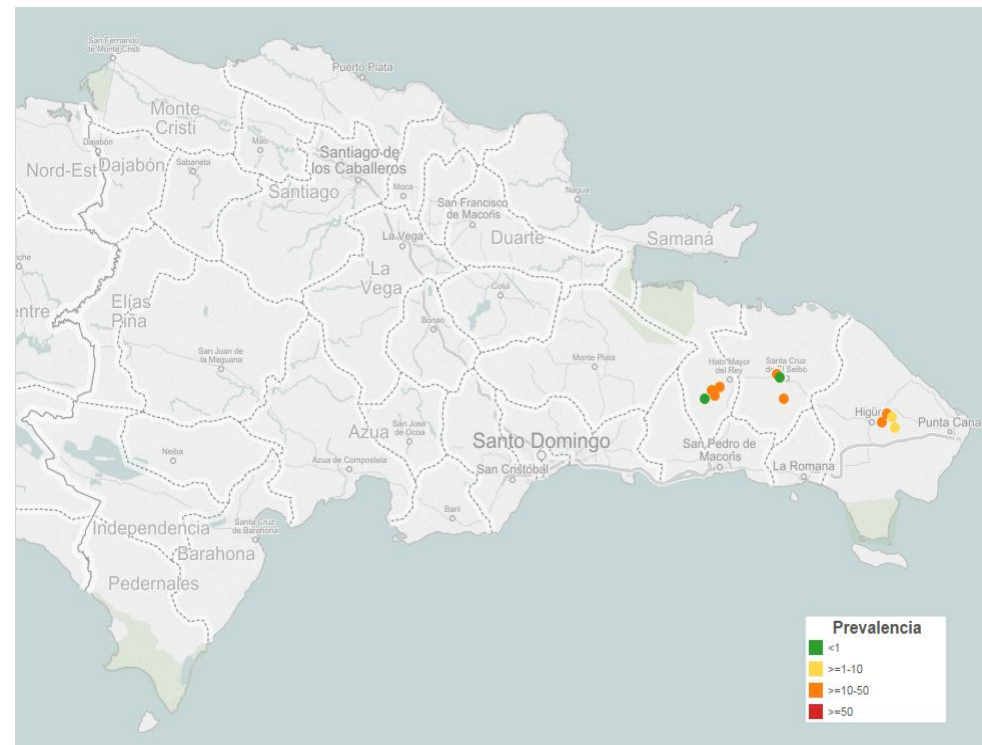
2º administrative level: 3/31 provinces

Nº of prevalence registries: 11

Highest prevalence: 31,0% Hato Mayor

Nº of intensity of infection registries: 2

Highest level of intensity of infection: 10,6
epg (La Altagracia)



RESULTS

Puerto Rico

Nº of articles: 15

Sample year period: 1952-1996

2º administrative level: 72/78 municipalities

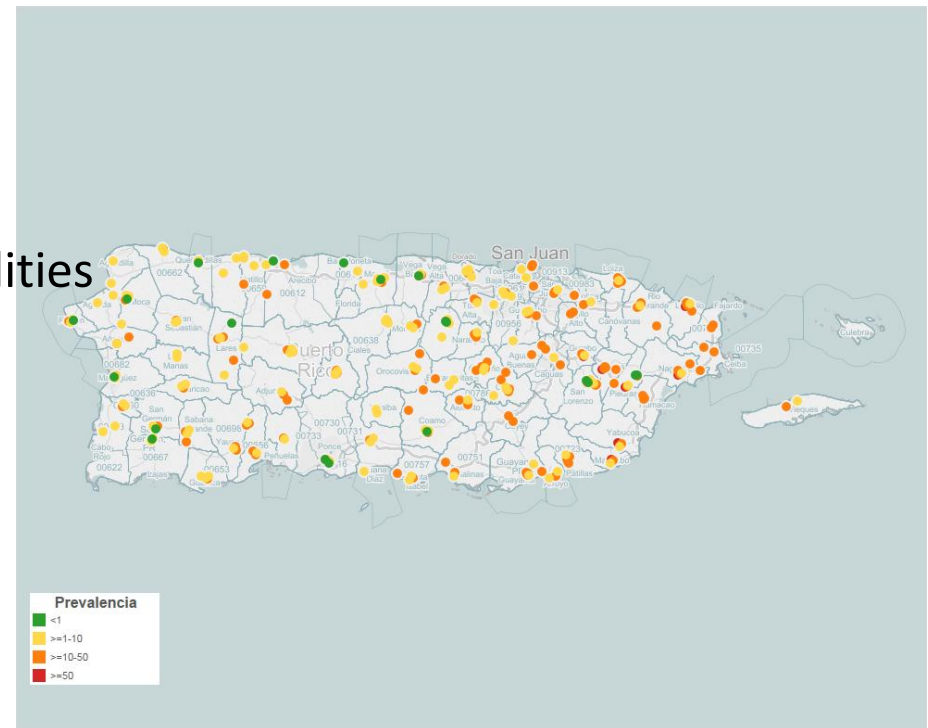
Nº of prevalence registries: 333

Highest prevalence: 72,0%

(Luquillo y Rio Grande)

Nº of intensity of infection registries: -

Highest level of intensity of infection: -



RESULTS

Saint Lucia

Nº of articles: 11

Sample year period: 1968-1996

2º administrative level: 6/9 regions

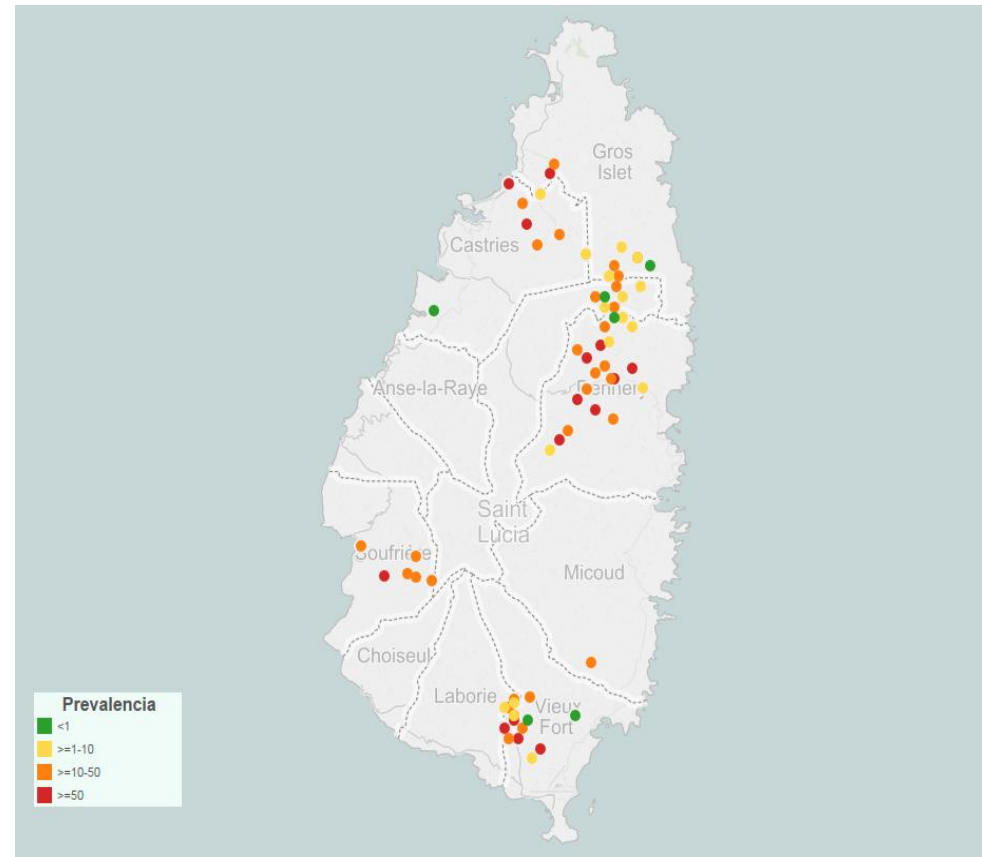
Nº of prevalence registries: 87

Highest prevalence: 74,2% region 5

Nº of intensity of infection registries: 43

Highest level of intensity of infection: 78

epg (Area under National Administration)



RESULTS

Surinam

Nº of articles: 4

Sample year period: 1968-1996

2º administrative level: 2/10 district

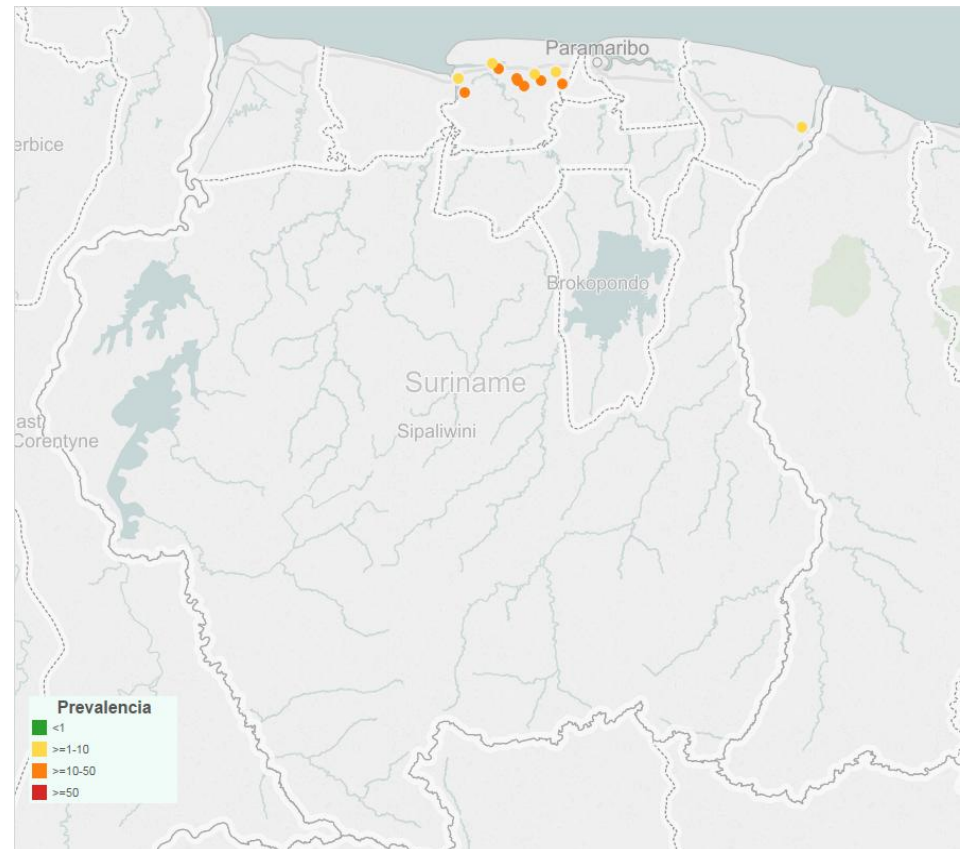
Nº of prevalence registries: 12

Highest prevalence: 38,0% (Saramacca)

Nº of intensity of infection registries: 1

Highest level of intensity of infection:

79,0 epg (Saramacca)



RESULTS

Venezuela

Nº of articles: 3

Sample year period: 1937-2000

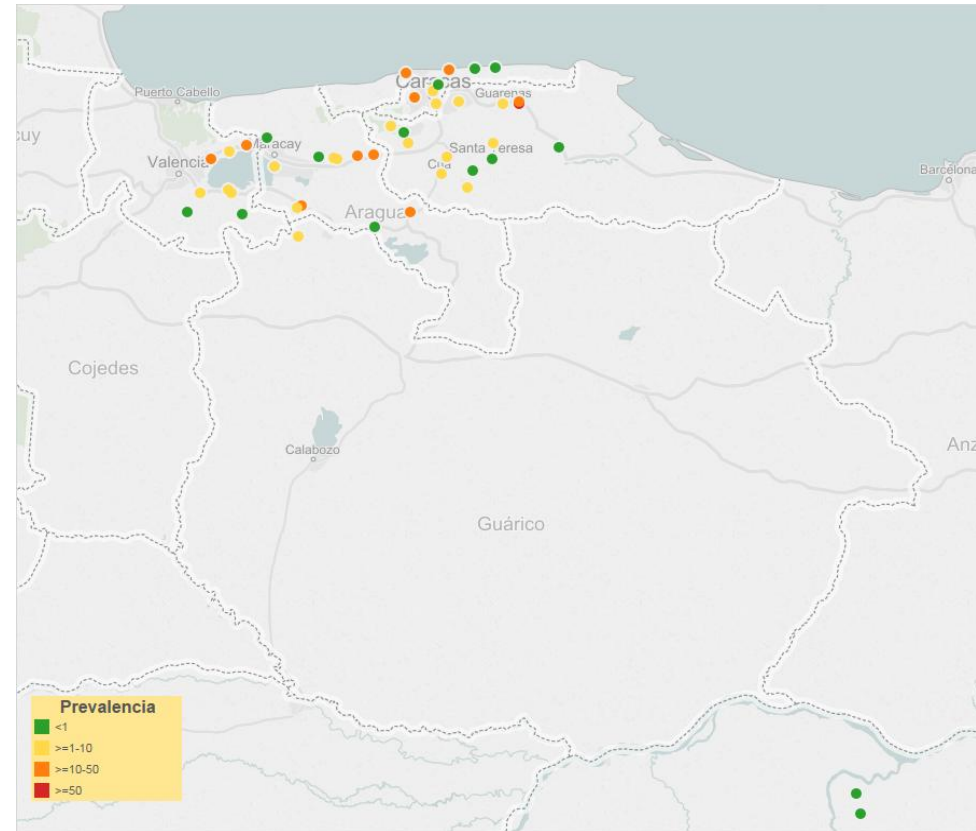
1º administrative level: 6/24 states

Nº of prevalence registries: 46

Highest prevalence: 58% (Miranda)

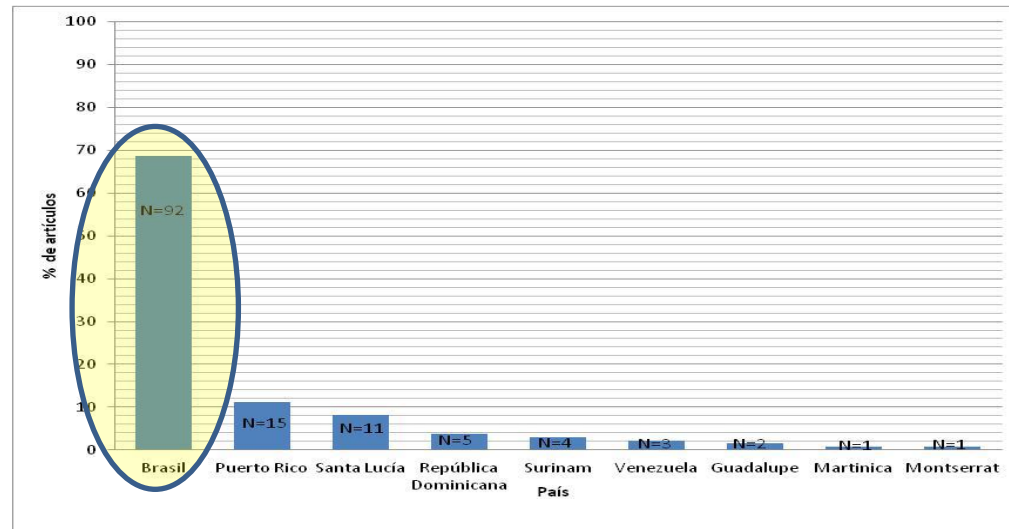
Nº of intensity of infection registries: -

Highest level of intensity of infection:-



DISCUSSION

1. Inequal number of publication per countries



2. Brazil is the only country that has epidemiological surveys conducted after 2001 --> Critical cities as “Hotspots” has been identified

DISCUSSION

2014, 89, 21–28

No. 2

Contents

21 Schistosomiasis: number of people receiving preventive chemotherapy in 2012

Sommaire

21 Schistosomiasis: nombre de personnes ayant bénéficié d'une chimioprévention en 2012

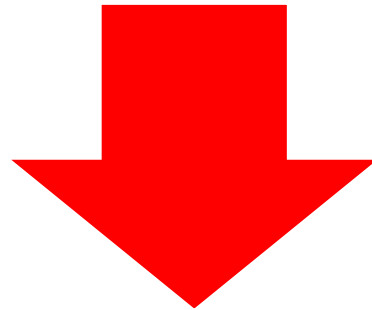
Characteristics – Caractéristiques	African – Afrique	The Americas – Amériques	South-East Asia – Asie du Sud-Est
Number of endemic countries ^a – Nombre de pays d'endémie ^a	42	10	3
Number of countries requiring preventive chemotherapy – Nombre de pays où la chimioprévention est nécessaire	40	2	1
Number of school-age children requiring preventive chemotherapy – Nombre d'enfants d'âge scolaire ayant besoin d'une chimioprévention	106 694 790	1 551 140	2 998
Number of adults requiring preventive chemotherapy – Nombre d'adultes ayant besoin d'une chimioprévention	125 264 856	–	–
Total number of people requiring preventive chemotherapy – Nombre total de personnes ayant besoin d'une chimioprévention	231 959 646	1 551 140	2 998
Number of countries where schistosomiasis status has yet to be determined – Nombre de pays où la situation de la schistosomiose doit encore être déterminée			
For planning and implementation – Pour la planification et la mise en œuvre	0	2	0
To verify whether interruption of transmission has been achieved – Pour vérifier si la transmission a bien été interrompue	2	6	2
Schistosomiasis treatment – Traitement contre la schistosomiose			
Number of countries reporting – Nombre de pays fournissant des informations	23	2	0
Number of people treated – Nombre de personnes traitées	35 564 555	27 460	–
Coverage (%) ^b – Couverture (%) ^b	13.6	1.8	–

These low coverages could be explained by:

- (1) Countries are not implementing MDA
- (2) The information systems of the countries have not been adapted to differentiate individual case reports vs. groups
- (3) Health professionals are not recording these treatment or not support collective interventions

DISCUSSION

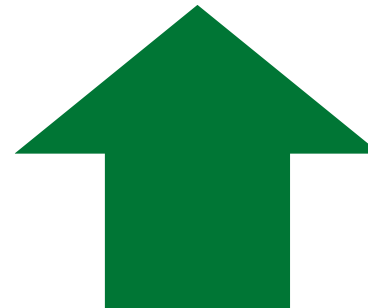
3. The epidemiological status of the other countries need updates and publication



Low or no transmission of schistosomiasis



- Difficulty to publish results in scientific journals
- Lack of human or financial resources to perform surveys



WER: Venezuela still requires MDA

4. Few articles study intensity of infection

(44 articles from 4 countries :Brazil, Dominican Republic, St. Lucia and Suriname)

- Only 4 articles (9.1%) used arithmetic mean
- Only Brazil reported the WHO levels (3articles)

ASSESSING THE EFFICACY OF ANTHELMINTHIC
DRUGS AGAINST SCHISTOSOMIASIS
AND SOIL-TRANSMITTED HELMINTHIASES

Helminth control in
school-age children



A guide for managers

- ☐ Is the first indicator which is reduced when MDA are implemented
- ☐ The geometric mean can infra or overestimate the effectiveness of treatment with praziquantel
- ☐ The classification of WHO levels allows rapid assessment of the proportion of people with severe morbidity

5. Great variability in the age groups studied: 59,8% SAC

WHY PSAC ARE LESS INCLUDED?

- ☐ Historically it was observed that the SAC had the highest infection rates
- ☐ The objectives of resolution WHA 54.19 were aimed at the SAC
- ☐ Is relatively easy to perform epidemiological surveys in schools serial treatments in a cohort schooled and evaluation of the impact of the intervention
- ☐ Praziquantel is not available in pediatric solutions and is difficult to adjust the dose in PSAC ages

DISCUSSION

Closing the praziquantel treatment gap: new steps in epidemiological monitoring and control of schistosomiasis in African infants and preschool-aged children

J. RUSSELL STOTHARD^{1*}, JOSÉ C. SOUSA-FIGUEIREDO^{1,2}, MARTHA BETSON¹, HELEN K. GREEN¹, EDMUND Y. W. SETO³, AMADOU GARBA⁴, MOUSSA SACKO⁵, FRANCISCA MUTAPI⁶, SUSANA VAZ NERY⁷, MUTAMAD A. AMIN⁸, MARGARET MUTAPI⁹, ALAN FENWICK⁹ and ANTONIO MO.

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Contents lists available at ScienceDirect

Acta Tropica

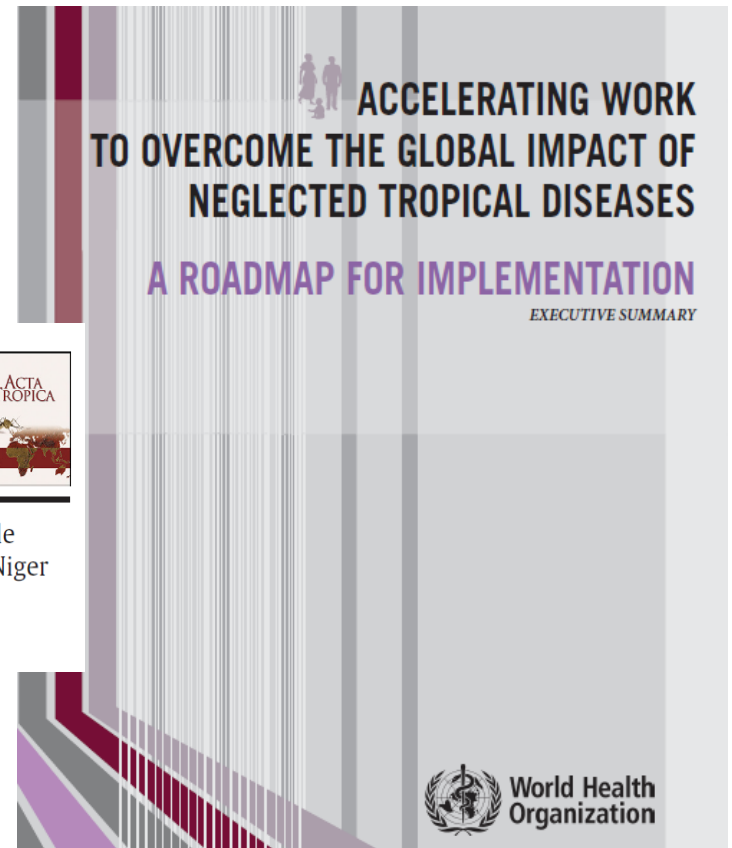
journal homepage: www.elsevier.com/locate/actatropica



Schistosomiasis in infants and preschool-aged children: Infection in a single *Schistosoma haematobium* and a mixed *S. haematobium*–*S. mansoni* foci of Niger

Amadou Garba^{a,b,*}, Nouhou Barkiré^c, Ali Djibo^c, Mariama S. Lamine^a, Boubacar Sofo^a, Anouk N. Gouvras^d, Elisa Bosqué-Oliva^d, Joanne P. Webster^d, J. Russell Stothard^e, Jürg Utzinger^b, Alan Fenwick^d

Africa: New evidence alarm over the high vulnerability of infection in PSAC



CONCLUSION

KEY MESSAGES OF THIS REVIEW

Methodological issues

Improvement the quality of the information through:

1. Describe the results in **children** regardless of the adult
2. Perform the classification of children according to the **school age**: PSAC (1-4 years) and SAC (5-15 years)
3. Include the **PSAC** in the epidemiological surveys
4. Report the **sample size**
5. Describe if the survey was done to the whole town or report the **sample method used**

CONCLUSION

Methodological issues

Improvement the quality of the information through:

6. Detail the **diagnostic test** used
7. Use diagnostic test the recommended by WHO: **kato-katz** technique with 2 slides per sample (4 as a gold standard)
8. Analyze the intensity of infection by **arithmetic mean**
9. Report the proportion of infected children as **WHO infection levels** (mild: 1-99epg, moderate: 100-499epg, severe: 500 epg or more)

CONCLUSION

Geographical information

1. **Areas of Brazil with high transmission currently**
(in Pernambuco, Minas Gerais, Bahia)
1. **Need to update (or publish)** the epidemiological status of several states of Brazil and other countries and additional territories historically endemic for schistosomiasis in LAC, which has not released any information since 2001

CONCLUSION

THANK YOU!!!

**Reducing health inequalities will require action
on policy**

- Social justice is a matter of life and death
- Health inequalities are not inevitable - can be significantly reduced
- **Give every child the best start!**

