SHORT COMMUNICATION

Changes in the distribution of human schistosomiasis in Far North province, Cameroon, since 1986

The most recent, large-scale survey on human urinary schistosomiasis (caused by *Schistosoma haematobium*) and human intestinal schistosomiasis (caused by *S. mansoni*) in Cameroon, which was carried out in 1986, revealed that both diseases were endemic throughout Far North province (Ratard *et al.*, 1990). In a survey in 2008–2009, Massenet *et al.* (2009) found that the prevalences of these diseases in the neighbouring North province were markedly lower than those recorded by Ratard *et al.* (1990), in the same area, about two decades earlier. Since antischistosomal treatment has never been delivered at community level in North province, the reasons behind this favourable trend were (and remain) unclear. The aim of the present, cross-sectional survey, conducted in 25 primary schools in 2009, was to see if urinary schistosomiasis and intestinal schistosomiasis had shown a similar decline in Far North province, from the prevalences of 35% and 9%, respectively, recorded among schoolchildren in 1986 (Ratard *et al.*, 1990). Lot quality assurance sampling (LQAS) was used, previous studies having shown this to be a cost-effective method of identifying communities that qualify for treatment (Rabarijaona *et al.*, 2003; Brooker *et al.*, 2005).

The 25 surveyed schools (see Figure) were those previously investigated, in 1986, by Ratard *et al.*, (1990). In each school, eight boys and seven girls were randomly selected from an exhaustive list of the children aged 9–11 years who were present on the day of the survey. Human infection with *S. mansoni* or *S. haematobium* is considered hyper-endemic in a community when eggs are observed in at least 50% of stool or urine samples, respectively. In each study school, for each of these schistosome

species, the null hypothesis (H_0) that the prevalence of infection was $\geq 50\%$ among all the schoolchildren was therefore explored. Using the LQAS method, the null hypothesis was accepted if at least four of the 15 children investigated were observed to be excreting the eggs of the schistosome of interest (this sampling plan gives a 95% probability of the null hypothesis being accepted when the prevalence is $\geq 50\%$, as well as an 80% probability of schistosomiasis being categorized as not hyper-endemic in a school where the prevalence of infection is $< 20\%$).

Each subject was given a stool container (including a specimen-collection spoon) and a urine container and asked to collect fresh stool and urine specimens between 10.00 and 15.00 hours. On the day of their collection, the stool specimens were checked for *S. mansoni* eggs as Kato–Katz smears (Katz *et al.*, 1972) while 10 ml of each urine sample were checked for *S. haematobium* eggs, by membrane filtration (WHO, 1985).

The locations of the 11 schools where *S. haematobium* infection was considered hyper-endemic are shown in the Figure. None of the surveyed schools was found hyper-endemic for *S. mansoni*.

After aggregation of the collected data, by department (see Table), the recorded prevalences of *S. haematobium* infection were found to be significantly higher in the Mayo Danay department than in any other department in Far North province ($P < 0.0001$). In 1979, a dam was built in Mayo Danay, to support the large-scale cultivation of irrigated rice, and it may be the resultant lake (Lake Maga), wetlands and irrigation canals that support relatively high levels of *S. haematobium* transmission in the department.

FIG. The locations of the schools surveyed in the Logone et Chari (1), Mayo Danay (2), Kaélé (3), Diamare (4), Mayo Sawa (5) and Mayo Tsanaga (6) departments of Far North province in 2009, showing the schools where *Schistosoma haematobium* was (●) or was not (•) considered hyper-endemic.

Six of the 11 schools found hyper-endemic for *S. haematobium* lie within Mayo Danay. The other five such schools are scattered throughout the other departments of Far North province (with low prevalences of *S. haematobium* infection recorded in neighbouring schools; see Figure). Such heterogeneity in the distribution of schistosomiasis in the province is similar to that observed in North province, in 2008–2009, by Massenet *et al.* (2009).

Schistosoma mansoni now appears to be relatively rare in Far North province, with no schools considered hyper-endemic for this parasite and only five (1.3%) of the 375 tested children found to be co-infected with *S. mansoni* and *S. haematobium*.

Although the results of such comparison must be interpreted with care, because the two surveys used different sampling methods, the Table allows the results of the survey in Far North province in 1986 study (Ratard

TABLE. Comparative results of the 1986 and 2009 examinations of urine samples (from schoolchildren in six departments of Far North province) for the eggs of *Schistosoma haematobium*

Department	No. and (%) of children in 2009:		No. and (%) of children in 1986:*	
	Investigated	Found positive	Investigated	Found positive
Logone et Chari	120	27 (23)	634	83 (13)
Kaélé	45	11 (24)	580	293 (51)
Mayo Danay	90	55 (61)	724	317 (44)
Diamare	30	7 (23)	674	192 (29)
Mayo Sawa	45	10 (22)	515	157 (31)
Mayo Tsanaga	45	15 (33)	579	262 (45)
All six	375	125 (33)	3706	1304 (35)

*Data from Ratard *et al.* (1990).

et al., 1990) to be compared with those recorded in 2009 (present study). The mean prevalence of *S. haematobium* infection detected in the schoolchildren of Far North province in 2009 (33%) was very similar to that recorded in 1986 (35%) but the geographical distribution of such infection appears to have changed markedly between the two surveys. For example, the prevalence of such infection in Mayo Danay department (which, in 1986, was close to the median value for all the other departments of the province) appears to have markedly increased. The mean prevalence of *S. mansoni* infection among the schoolchildren of Far North province seems to have decreased between the surveys, from 9% in 1986 to 4% in 2009 ($P=0.001$), without any delivery of antischistosomal treatment at community level. A similar decrease in the prevalence of schistosomal infection, in the absence of any systematic praziquantel treatment, was found to have occurred in neighbouring North province in 2008–2009 (Massenet *et al.*, 2009). The reason behind the temporal and geographical changes seen in the prevalence of schistosomal infection in northern Cameroon, in the absence of community-level treatment, merit further research.

Province and the managers and teachers of the surveyed schools for their invaluable collaboration. This survey was funded by the French Ministry of Foreign Affairs (via the French Embassy in Cameroon). The authors thank Dr P. Boisier for his assistance in the preparation of the manuscript.

D. MASSENET

A. TOUKOUR

Centre Pasteur du Cameroun Annexe de
Garoua, B.P. 921, Garoua, Cameroon

R. I. KAMWA NGASSAM

Centre for Schistosomiasis and
Parasitology, B.P. 7244, Yaoundé,
Cameroon

R. DJAO

Délégation Sanitaire Régionale de
l'Extrême-Nord, Maroua, Cameroon

J.-L. PORTAL

Service de Coopération et d'Action
Culturelle, Ambassade de France au
Cameroun, B.P. 1616, Yaoundé,
Cameroon

ACKNOWLEDGEMENTS. The authors gratefully acknowledge the health authorities of Far North

L.-A. TCHUEM TCHUENTÉ

National Programme for the Control of Schistosomiasis and Intestinal Helminthiasis, Centre for Schistosomiasis and Parasitology, B.P. 7244, Yaoundé, Cameroon, and Laboratoire de Biologie Générale, Faculté des Sciences, Université de Yaoundé I, B.P. 812, Yaoundé, Cameroon

*Received 18 August 2010,
Revised 18 March 2011,
Accepted 21 March 2011*

Reprint requests to: D. Massenet.
E-mail: denis.massenet@laposte.net.

REFERENCES

- Brooker, S., Kabatereine, N. B., Myatt, M., Stothard, J. R. & Fenwick, A. (2005). *Tropical Medicine and International Health*, **10**, 647–658.
- Katz, N., Chaves, A. & Pellegrino, J. (1972). *Revista do Instituto de Medicina Tropical de São Paulo*, **14**, 397–400.
- Massenet, D., Inrombe, J., Dawaye, O., Abdoulaye, Y., Portal, J.-L., Boisier, P. & Tchuem Tchuenté, L. A. (2009). *Annals of Tropical Medicine and Parasitology*, **103**, 745–750.
- Rabarijaona, L. P., Boisier, P., Ravaoalimalala, V. E., Roux, J. F., Jutant, M. A. & Salamon, R. (2003). *Tropical Medicine and International Health*, **8**, 322–328.
- Ratard, R. C., Kouemene, L. E. & Ekani Bessala, M. M. (1990). *American Journal of Tropical Medicine and Hygiene*, **42**, 561–572.
- World Health Organization (1985). *The Control of Schistosomiasis: Report of a WHO Expert Committee*. Technical Report Series No. 728. Geneva: WHO.