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Gauging potential schistosomiasis exposure in northern Senegal from activity-specific water contact estimates

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Introduction

Context

The construction of the Diama Dam in 1986 triggered an epidemic of schistosomiasis. The Senegal River Basin and Lac de Guiers remain hyper-endemic foci of transmission (Fig 1)

Background

- Because free-swimming schistosome cercariae burrow into human skin, direct contact with water can cause schistosome infection
- Rural communities depend on local surface waters for household and occupational needs, making water contact a common occurrence
- Patterns of human water contact are socially determined with important differences across age, gender and occupational groups
- Most epidemiologic studies of water contact focus on frequency and duration of contact, without accounting for how much of the body is submerged

Objective

Estimate the body surface area exposed while performing seven different water contact activities common in the region.



Figure 1. The Diama Dam is a saltwater barrier that supports irrigated agriculture in the Senegal River Basin

Methods

Study Area included 15 villages selected for a larger intervention study: 5 along the Senegal River and 10 on the shore of Lac de Guiers (Fig 1).

Data Collection

- Brief interviews were conducted with village residents, often at village water points (Fig 2)
- Two interviews per village - one with a man, one with a woman - for a total of 30 interviews
- Each interviewee was asked how much of the body comes into contact with water when performing or observing seven different common water contact activities , for a total of 210 observations
 - Washing laundry
 - Washing dishes
 - Collecting water
 - Irrigating fields
 - Washing livestock
 - Fishing (in a canoe)
 - Fishing (from shore)



Figure 2. Interview being conducted with a woman at a village water point

- Responses for each activity were registered on a diagram used to measure burn size (Fig 3)

Data Analysis

- Percent body surface area (%BSA) exposed per activity was calculated based on estimates (Lund & Browder 1944)
- Comparison of %BSA with frequency and duration of water contact from Sow et al 2011
- Non-parametric means comparison using the Mann-Whitney U test

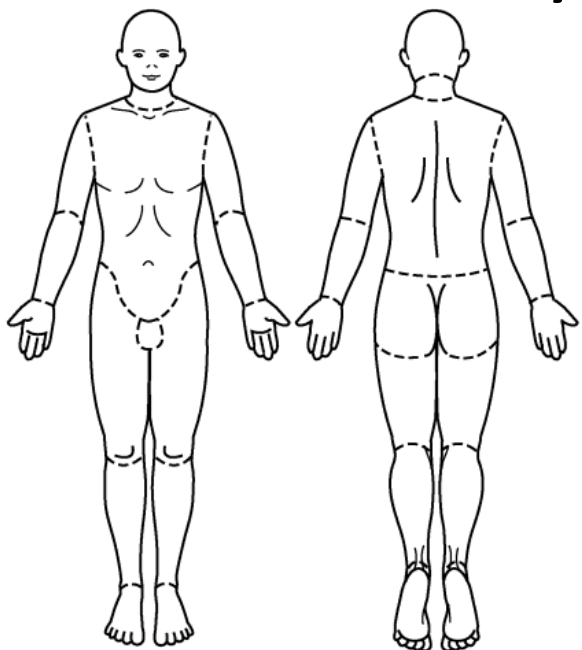


Figure 3. Burn size diagram used to quantify water contact during interviews

Results

Percent BSA Estimates Complement Existing Results of Existing Water Contact Studies

Activity	%BSA Mean	%BSA SD	$\frac{D_a}{C}$	$\frac{\%BSA * D}{C}$
Laundry	35.75	16.32	26.61 ^b	951.31
Dishes	31.81	12.11	26.61 ^b	846.46
Water collection	45.27	15.86	1.98	89.63
Irrigation	22.50	9.95	7.86	176.85
Livestock	41.53	14.86	9.31	386.64
Canoe fishing	21.55	15.08	1.93 ^c	41.59
Shore fishing	47.64	17.45	23.77	1132.40

^a Duration per contact derived from Sow et al 2011 on frequency and duration of contact within study period; ^b Collapsed these categories to “household”; ^c Classified as “disembarking”

Bathing common in combination with several different activities

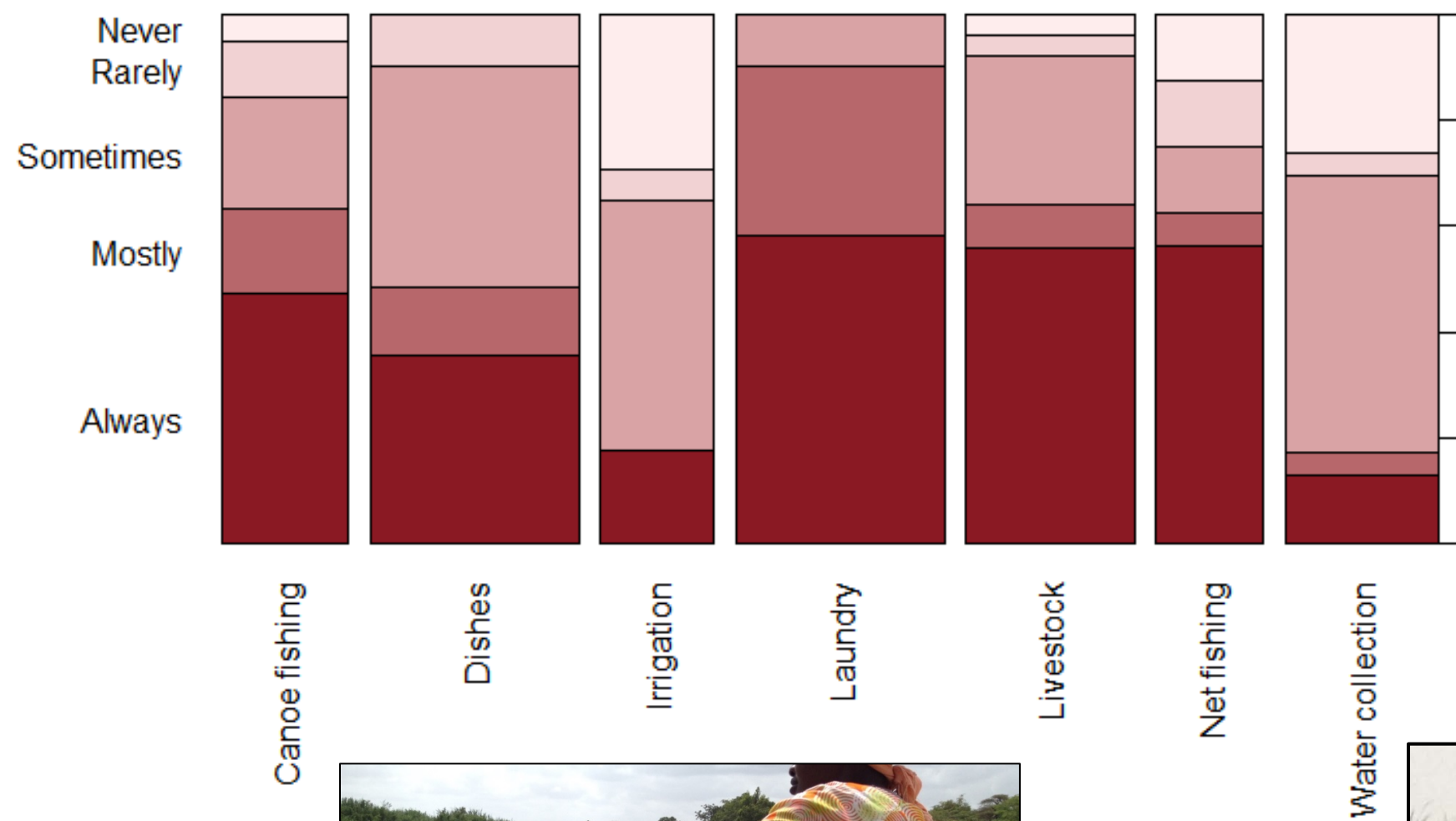


Figure 5. Most women bathe after laundry

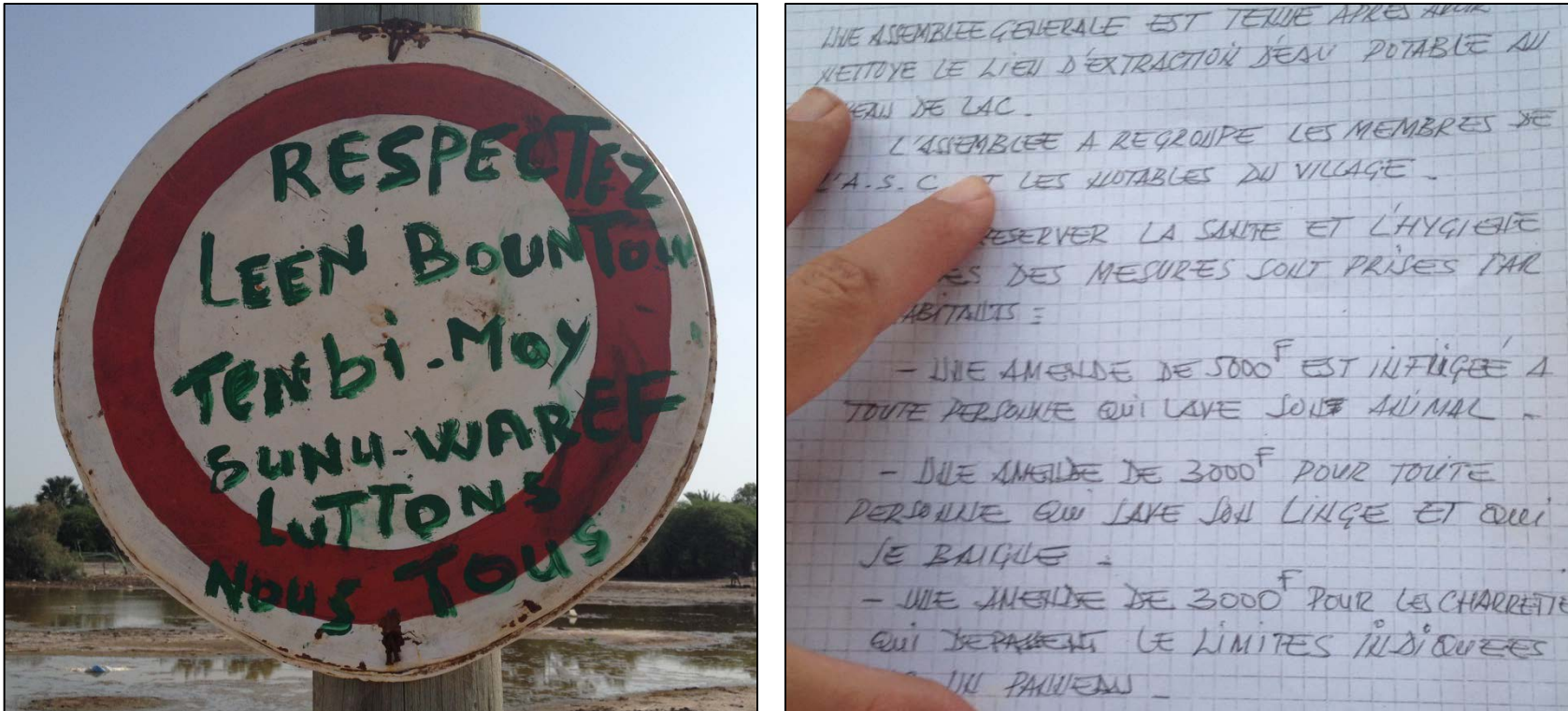


Figure 4. Some villages have formal policies regarding the use of water points

Community-level characteristics influence water contact patterns

- Seasonal variation in water levels influences water quality and the need for increased water contact
- Percent BSA for water collection may be greater in lake villages (mean 36.98, SD 18.97) than river villages (mean 32.37, SD 14.63) (W = 6478, $p = 0.065$).
- Formal policies govern water in some communities (Fig 4)
- Presence of piped water sources enables reduction in water contact, but doesn’t guarantee it

Techniques for washing livestock vary



Figure 6. Boys washing horses (left); man washing sheep (right)

Future Directions

- Utilize GPS data-loggers to understand network of water contact activity in study villages with multiple water contact sites
- Employ activity-specific %BSA estimates in post-GPS interviews to complement frequency and duration data from GPS devices
- Operationalize community-level factors that influence water contact so they can be used in future quantitative analyses
- Study distribution of water contact activities among population groups within villages



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