A state baseline prevalence survey of soil transmitted helminths in Bihar

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Summary Report

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Produced in Partnership With: the Bihar Education Project Council and the State Health Society, Bihar, India, Deworm The World, Washington DC, USA and Partnership for Child Development, London, UK.

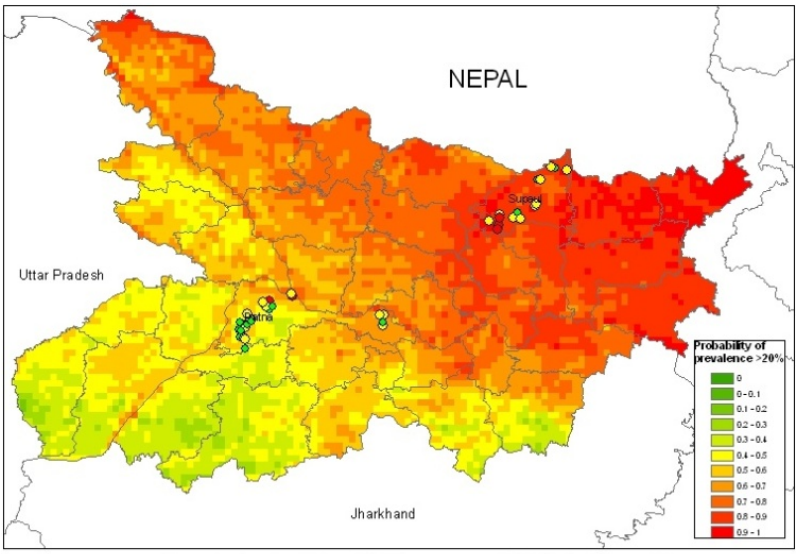
BACKGROUND

Bihar is shown to be an environment conducive to STH transmission, with some of the poorest sanitation indicators in India. Recognising this, and following the success of the programme in AP, the state education and health authorities were keen to put in place a deworming programme as a platform for school health. Technical assistance for a survey was commissioned to inform programme strategy.

Table One: Results of initial two district survey in Bihar

District	Number of Samples	Number infected with STH	Prevalence of STH
Supaul District	954	342	35.8%
Patna District	1125	256	22.8%

Based on the initial findings of the survey which predicted high STH prevalence the government were able to plan and implement a single round of treatment to the state of Bihar, which began a staggered roll out in January 2011.



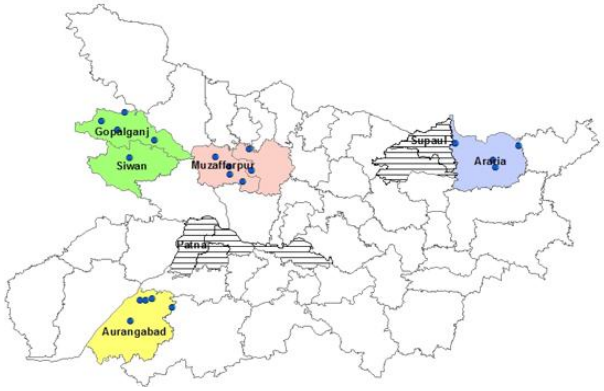
Predicted probability of STH prevalence>20% in Bihar state

Interspersed with the roll out, additional surveys were conducted to provide further baseline prevalence information (6 months after the LF treatment) to inform the government if any areas required twice annual treatment or if any areas were confirmed unlikely to have high prevalence.

METHODOLOGY

Training of technicians and community volunteers took place at Nalanda Medical School, Patna, where 19 technicians and 12 community volunteers attended. Training introduced the participants to STH, school-based surveying and sample collection. Community volunteers were introduced to Kato Katz technique while technicians underwent a revision session and refreshed related microscopy skills. Each team of technicians then carried out 2 weeks of surveying, processing, and slide reading under the supervision of a senior parasitologist and program manager.

Surveying: Four districts of Bihar were selected to complement the existing STH model and twenty schools, five from each district were randomly selected (in map to right: previously surveyed districts are striped while the remaining districts in colour were covered during the first round of surveying).



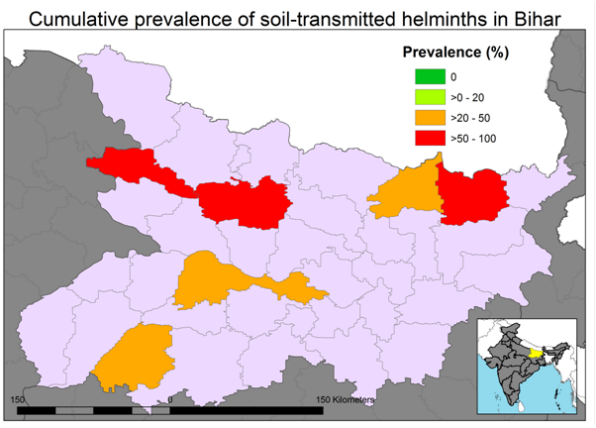
Within each school 65 children aged 6 and above representing both sexes equally from class 1 to 6 were randomly selected. Over two days the team initially, obtained school consent, and selected the children, verbal consent was also obtained from each participant, who was then asked to provide a stool sample for the following day. The demographic data such as name, sex, age and class, caste as well as height and weight were recorded form each participating child. Socio-economic data was collected by trained community volunteer. On the second day, sample collection took place and following submission of samples, all children were provided with soap and water to wash their hands under supervision.

Screening of infection for STH was based on a double Kato-Katz smear of 41.7 mg prepared from fresh stool samples. The mean total number of eggs was expressed as eggs per gram (EPG) of faeces.

Treatment Schedule: Data was entered into excel and analysis was conducted using excel and STATA. Maps were produced in Arc Map 9.3 (ERSI, Redlands, CA, USA) and recommendations were made based on WHO guidelines for a mass school-based deworming strategy.

KEY RESULTS

From a total of 1,281 school children registered in the survey 1,159 returned samples. The registration of 65 students was based upon a predicted return rate of 75 percent seen in similar surveys and so the demonstrated return rate of 90.5 percent represents a major success.



The prevalence of STH (including *hookworm, A. lumbricoides, and T. trichiura*) across these states in Bihar was 67.5% with district prevalence ranging from 49.0% to 79.6%.

Ascaris and Hookworm had similar overall prevalence in the survey 52.1% and 42.2% respectively, and only in Aurangabad was hookworm prevalence greater than Ascaris and Trichuris was the least common species in all districts.

Table Three: Cumulative prevalence of each species by district

District	Number Students	% Hookworm	% Ascaris	% Trichuris	% Any Infection
Araria	265	(87) 32.8%	(191) 72.1%	(30) 11.3%	(211) 79.6%
Aurangabad	296	(119) 40.2%	(74) 25.0%	(5) 1.7%	(145)49.0%
Muzzaffpur	300	(117) 39.0%	(140) 46.7%	(17) 5.7%	(189) 63.0%
Gopalganj	298	(166) 55.7%	(199) 66.8%	(8) 2.7%	(237) 79.5%
Total	1159	(489) 42.2%	(604) 52.1%	(60) 5.2%	(782) 67.5%

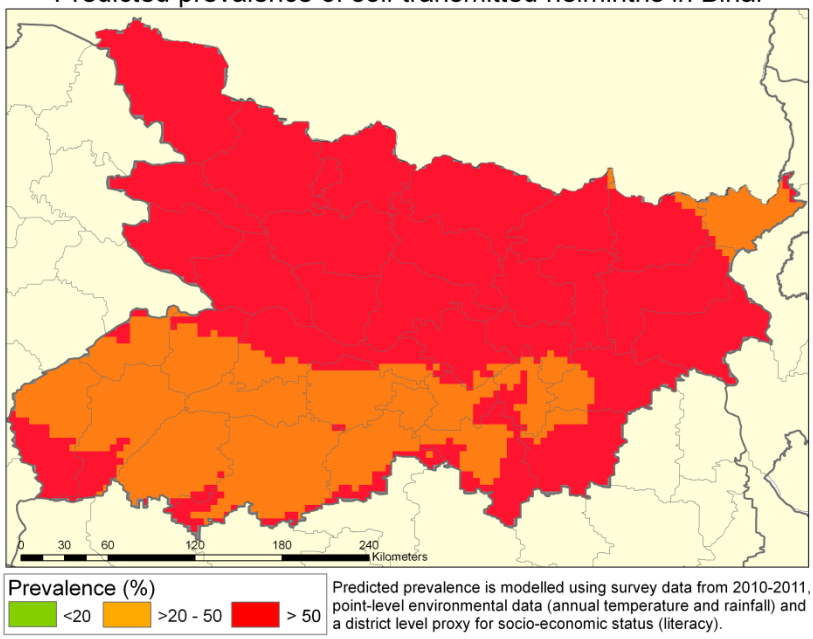
Within each district there was often a range of prevalence seen across the schools. Aurangabad showed the greatest variation with the lowest prevalence of 9.5% (95% CI 2.3%-16.8%) and a highest of 84.6% (95% CI 75.9%-93.4%).

A large proportion of infected children had more than one species of STH (40.9%), usually ascaris and hookworm, though 26 children were infected with all three STH species.

Classification of infections using WHO guidelines showed that 16% of infected children had medium or high intensity infections.

Modelling of the results to inform a state level treatment map was done using the cumulative 2010 and 2011 data for 6 districts (shown above).

Predicted prevalence of soil-transmitted helminths in Bihar

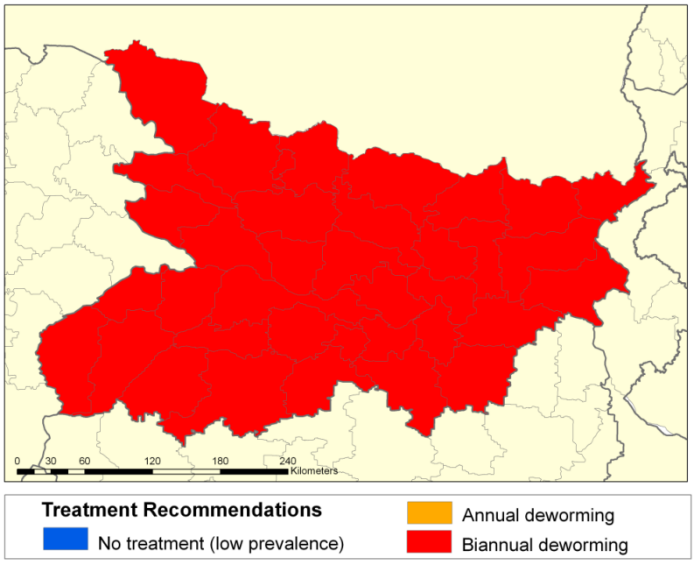


Predicted prevalence is modelled using survey data from 2010-2011, point-level environmental data (annual temperature and rainfall) and a district level proxy for socio-economic status (literacy).

TREATMENT SCHEDULE

Prevalence of STH in the districts surveyed is predicted to be high, often high enough for bi-annual treatment. The high prevalence must also be taken in the context of a community wide LF programme which included Albendazole distribution only 6 months prior to the second survey. All head teachers and teachers involved in the survey were asked if the LF programme or any other deworming had reached their community and only 3 remembered receiving the treatment. These schools had prevalence of 47.5%, 63.6% and 87.9% indicating that following treatment significant bounce back of infection had occurred within 6 months. The lower prevalence around the south west is driven by the higher socio-economic status around the capital. However, it is thought that these areas are very diverse and while having many people of higher socio-economic status there are also many slum and peri-urban areas around the capital, representing large numbers of children for whom exclusion from treatment would not be advantageous.

In this context, biannual treatment is recommended throughout Bihar.



Acknowledgements

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Lastly, sincere appreciation is extended to all schools, head teachers, school teachers and school children who volunteered to participate in the survey and to all the technicians and community volunteers without whose services and expertise this survey would not have been possible.

Appendix: Results by school and school level map

District	School	No. children	%Hw	%As	%Tri	% Any
Muzzaffpur	P.S. BARKA GAWN KASBA	59	40.7%	27.1%	3.4%	47.5%
Muzzaffpur	P.S. SHAHPUR DAKHILI (DPEP)	63	39.7%	28.6%	7.9%	46.0%
Muzzaffpur	P.S.PIPRA SEN	59	25.4%	74.6%	13.6%	81.4%
Muzzaffpur	UPG. M...S.PARSAUNI PAKRI	56	33.9%	46.4%	3.6%	62.5%
Muzzaffpur	P.S.GOPI DHANWAT	63	54.0%	57.1%	0.0%	77.8%
Gopalganj	N.P.S. PETBHARIYA	65	60.0%	84.6%	3.1%	90.8%
Gopalganj	P.S.SURAVAL WEST	57	49.1%	45.6%	3.5%	73.7%
Gopalganj	M.S. PATAKHAULI	55	67.3%	92.7%	1.8%	94.5%
Gopalganj	Phulwaria	63	38.1%	52.4%	1.6%	52.4%
Gopalganj	P.S.HARADIYA	58	65.5%	58.6%	3.4%	87.9%
Araria	CS RAHIKPUR	50	56.0%	68.0%	6.0%	78.0%
Araria	MS Kalia Ganj	50	12.0%	60.0%	18.0%	72.0%
Araria	PS BHEBRA PASCHIM TOLA	53	9.4%	67.9%	1.9%	67.9%
Araria	PS LAXMIPUR PURANDAHA	59	40.7%	69.5%	28.8%	83.1%
Araria	PS SHARMA TOLA	53	45.3%	94.3%	0.0%	96.2%
Aurangabad	PRIMARY SCHOOL UDAYMAN CHAK	65	76.9%	47.7%	3.1%	84.6%
Aurangabad	PRIMARY SCHOOL KARMAHI	56	58.9%	28.6%	5.4%	66.1%
Aurangabad	MIDDLE SCHOOL KHUTHAN	55	52.7%	27.3%	0.0%	63.6%
Aurangabad	URDU PRIMARY SCHOOL KURHAMA	57	8.8%	12.3%	0.0%	21.1%
Aurangabad	PRIMARY SCHOOL DULAHBIGHA	63	3.2%	7.9%	0.0%	9.5%

Figure Four: Map of point prevalence all STH