Ministry of Education

Ministry of Health

NATIONAL SCHOOL-BASED DEWORMING PROGRAMME

Year 10 (2021-2022) Treatment Results

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Abbreviations

CHA	-	Community Health Assistant
CHEW	-	Community Health Extension Worker
CSO	-	Curriculum Support Officer
CSPro	-	Census and Survey Processing System
CS	-	Cabinet Secretary
DASH	-	Division of Adolescent and School Health
DHIS	-	District Health Information System
ECDE	-	Early Childhood Development Education
EPHP	-	Elimination as a Public Health Problem
ESACIPAC	-	Eastern and Southern Africa Centre of International Parasite Control
HRIO	-	Health Records and Information Officer
ICT	-	Information and Communication Technology
KEMRI	-	Kenya Medical Research Institute
MBG	-	Model-Based Geostatistics
MOE	-	Ministry of Education
MOH	-	Ministry of Health
NEMIS	-	National Education Management Information System
NSBD	-	National School-Based Deworming
PC	-	Preventive Chemotherapy
PS	-	Principal Secretary
PSAC	-	Pre-school Age Children
SAC	-	School Age Children
SAE	-	Serious Adverse Event
SCDE	-	Sub County Director of Education
SCH	-	Schistosomiasis
SCMOH	-	Sub County Medical Officer for Health
SHNM	-	School Health Nutrition and Meals
SMS	-	Short Message Service
STH	-	Soil Transmitted Helminths
UIC	-	Unique Institution Code
WHO	-	World Health Organisation

Overview of the National School-Based Deworming Programme

The National School-Based Deworming (NSBD) Programme, is an inter-ministerial, government-led initiative that has proven successful in providing annual deworming treatments to millions of children at-risk for parasitic worm infection. In 2012, marking the initial scale-up of school-based deworming, the Ministries of Health and Education together set out to treat at least 5.5 million children per year for soil-transmitted helminths and have exceeded their target year after year. The programme goal is to eliminate parasitic worm infection as a public health problem in Kenya and it is on its way to achieving the World Health Organisation's 2030 disease targets as set within the *WHO road map for neglected tropical diseases 2021–2030.*

Over the last 10 years of implementation (2012-2022), NSBD Programme targeted over six million children aged 2-14 years across 27 at-risk counties for annual treatment against worm infection; soil-transmitted helminthiasis and schistosomiasis. The twenty-seven counties endemic for soil-transmitted helminthiasis are spread across Nyanza, Western, Rift Valley, Coast, North Eastern, Eastern, and Central Regions, with 15 of the total 27 co-endemic for schistosomiasis.

During the programme scale-up and maintenance phase, treating children through schools provides the greatest opportunity to reach a high proportion of the at-risk population while minimizing costs by using existing infrastructure. School-based deworming effectively reaches over 80% of the target population -children aged 2-14 regardless of school enrolment- in all at-risk geographies in the country. Trained and trusted primary school teachers administer deworming medicines annually ensuring medicines are appropriately taken.

The Division of Adolescent and School Health (DASH) within the Ministry of Health, Kenya Medical Research Institute (KEMRI), and the School Health, Nutrition and Meals (SHNM) Unit within the Ministry of Education lead, coordinate, and monitor NSBD at the national level, with technical support from Deworm the World Initiative at Evidence Action. Detailed planning and programme implementation is conducted at the county level with personnel from the two ministries playing a joint leadership role to ensure that the programme is implemented in every school within the targeted treatment areas.

Impact of Deworming: The Evidence

Rigorous evidence shows that mass deworming is a cost-effective solution that transforms the lives of children over the short and long term. Deworming treatment leads to significant weight gains and allows more energy to be focused on child growth and development. A study in Uganda[1], for example, found that deworming increased child weight by 10% for children who received treatment twice per year, and by 5% for children who received treatment annually. School-based mass deworming has also been shown to reduce school absenteeism more cost-effectively than alternative ways of increasing school attendance. In Kenya, school-based mass deworming reduced school absenteeism by 25% for those in treatment schools. Furthermore, deworming has spill over effects for untreated school-age and pre-school children. In Kenya[2], young siblings of those treated, as well as children who lived near treatment schools but were too young to be dewormed, showed gains in cognitive development equal to half a year of schooling when evaluated ten years later.

The impact of deworming on children goes beyond health and education outcomes. A landmark study[3] published in 2020, led by Edward Miguel and Nobel laureate Michael Kremer, offers new evidence of the long-term benefits of school-based deworming. According to the study, which followed a group of Kenyan students every 5 years over a 20-year period, receiving two to three additional years of deworming increased their income by 13% and consumption by 14% decades after treatment. An extra two to three years of deworming treatments in school also significantly increased the likelihood (by 9%) of working outside of agriculture and in urban areas, which presents more opportunities for jobs that largely pay better and offer more opportunities for growth. The study also calculated that the investment in deworming Kenya's children has so far had a 37% annualised rate of return.

[1] Alderman, H., Konde-Lule, J., Sebuliba, I., Bundy, D., & Hall, A. (2006). Effect on weight gain of routinely giving albendazole to preschool children during child health days in Uganda: cluster randomised controlled trial. BMJ. 333:122
[2] Miguel, E. & Kremer, M. (2004). Worms: Identifying impacts on education and health in the presence of treatment externalities
[3] Hamory, J., Miguel, E., Walker, M., Kremer, M., & Baird, S. (2020). Twenty Year Economic Impacts of Deworming. University of California, Berkeley

Implementing the National School-Based Deworming Programme: The Cascade

The National School-Based Deworming Programme uses a cascade implementation model that efficiently and cost-effectively delivers training, deworming medicine, and programme materials from the national level to schools. The cascade brings together personnel from the Ministry of Education (MOE) and Ministry of Health (MOH) for collaborative leadership in planning, training, implementation, and monitoring of programme activities at all levels.

1 COUNTY SENSITIZATION AND PLANNING MEETINGS

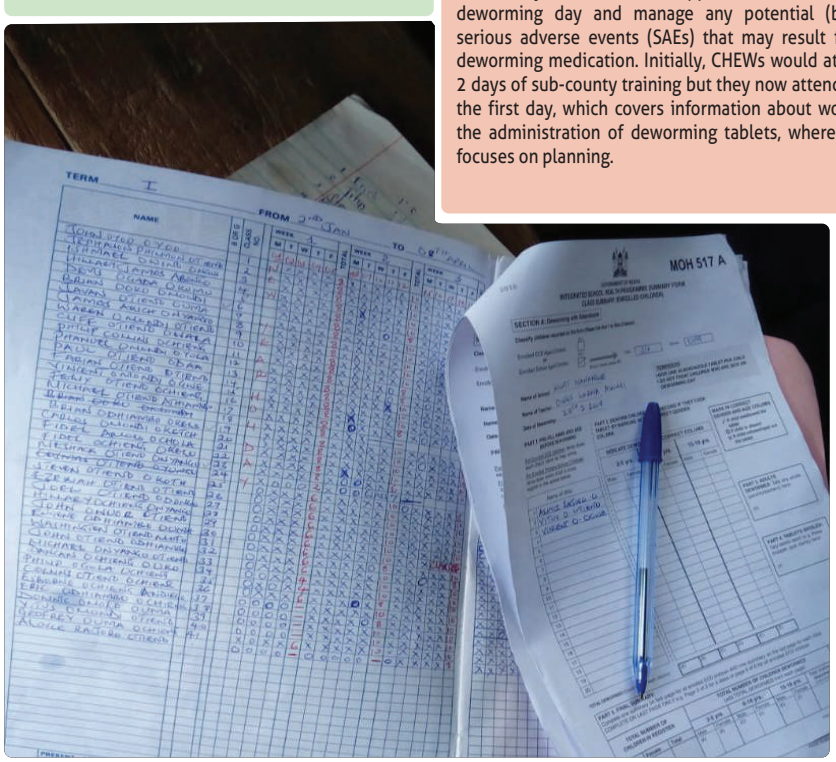
County Directors of Education and Health convene sensitisation meetings on the programme. This allows the programme to gain buy-in and build partnerships with county-level leaders. Over time, the counties have taken up the responsibilities of renting meeting venues and provision of projectors.

2 SUB-COUNTY TRAINING

Master trainers, nominated from MOE and MOH personnel in implementing counties, are responsible for training sub-county and zone / ward-level personnel on managing and implementing the programme. Community Health Extension Workers (CHEWs) / Community Health Assistants (CHAs) also attend this training to learn how to support community mobilisation, support schools during the deworming day and manage any potential (but rare) serious adverse events (SAEs) that may result from the deworming medication. Initially, CHEWs would attend the 2 days of sub-county training but they now attend on only the first day, which covers information about worms and the administration of deworming tablets, whereas day 2 focuses on planning.

3 TEACHER TRAINING

Teachers are critical to the programme's success and sustainability. They help in the administration of deworming medicines in schools. Head teachers and health teachers are trained to sensitise children, other teachers, and the community; administer deworming medicine; and properly fill and submit reporting forms after deworming day. To meet sustainability goals, the programme has over time optimised the teacher-to-learner ratio by reducing the number of teachers trained, so that schools with fewer than 350 learners now have only one teacher trained.



4 COMMUNITY SENSITISATION AND MOBILISATION

Before deworming day, health workers and teachers share key messages with children, parents, and local leaders, encouraging community members to bring their children for deworming. Posters are put up in schools and strategic community locations to inform and emphasise the importance of deworming, how to prevent infections and the date and location of treatment. Previously, town announcers disseminated these key messages, but after feedback that radio would likely reach a wider audience, the programme piloted and adopted radio advertising.

5 DEWORMING DAY

On the designated County deworming day, teachers administer deworming medicine to children aged 2-14 years in public and private primary schools, as well as in nearby Early Childhood Development Education (ECDE) centres. Children 2-14 years of age that are not attending school can access deworming medicines by going to the nearest primary school for treatment. Teachers fill out treatment forms to record the number of children treated. These forms have been revised several times to match MOH requirements for data entry into DHIS, a health management information system. MOH personnel visit schools to support and monitor drug administration and manage any serious adverse events that might occur.

6 REVERSE CASCADE

Once the deworming exercise is complete, Curriculum Support Officers (CSOs) collect 2 copies of the school summary treatment data forms from the schools, summarise them on division summary form, and hand all forms over to the Sub- County Directors of Education (SCDEs). The SCDEs collate the data onto the sub-county summary, then pass along a copy to the Sub County Medical Officer for Health (SCMOH) for data entry by Health Records and Information Officers (HRIOs), and send a copy (alongside school and division summaries) to the national secretariat. In Y10 however, in line with sustainability goals, teachers entered data into The National Education Management Information System (NEMIS) at the school level, a web-based data management system. HRIOs then uploaded this data into a DHIS instance created for the programme.

Of note is the role that the ECD teachers play in ensuring that the target population is reached. In a study done in the Coastal region of Kenya*, it was noted that some ECD centers were as far as 7km from the nearest primary school. Considering the age of learners in ECD centers, it was noted that some children miss out on deworming because they cannot cover this distance. The study proposed that ECD teachers, being a potential resource to the programme, should be empowered to administer deworming medicines. The same was adopted in Y9 (2020-2021) and has indeed resulted in better reach of pre-school age children.

*Njomo, D.W., Masaku, J., Odhiambo, G. et al. (2016). The role of pre-school teachers in the control of soil-transmitted helminthes in coastal region, Kenya.

Successes, Challenges and Recommendations

Once the deworming activities have been completed, counties, sub-counties and the secretariat hold debrief meetings to share their feedback on the successes, challenges, and recommendations for the programme.

Successes

- 17 County sensitisation meetings, 112 sub-county trainings, and 624 teacher trainings conducted with 12,303 teachers trained
- Excellent collaboration continues to be witnessed between the Ministries of Health and Education, at all levels
- There was timely delivery of deworming medicine, budgetary disbursements of funds to adequately facilitate all activities from sub-county training to deworming day
- Support was received from the Secretariat whenever the need arose and concerns were addressed satisfactorily
- Teacher training sessions had good attendance rates, with many head teachers attending. Sessions were able to run on time
- Sufficient numbers of community health assistants with sufficient materials to sensitise the community, resulting in many out-of-school children being reached
- Stakeholders such as parents, the religious fraternity, county governments, and the provincial administration continued to show significant support for the programme
- The introduction of data entry at the school and sub-county levels into the NEMIS and DHIS systems respectively was an important step towards full government ownership
- NEMIS and HRIO training was done beforehand and support was offered until the end of the exercise. Some sub-counties reported 100% of their schools in both systems quite soon after deworming and it was deemed an overall success

Challenges

- There were some delays in the submission of treatment data forms from the schools to the sub-counties, resulting in a delay in the entry of data by the HRIOs into DHIS
- Head teachers experienced challenges when entering data into NEMIS, ranging from not being tech-savvy to experiencing internet connectivity challenges. It appears the data entry process was not well understood during training
- Schools without NEMIS codes had to begin the process of acquiring them before entering data while others had forgotten their passwords so they needed to have them reset
- Some school details were missing, more so on DHIS, with a significant number having been captured in the wrong sub-counties, so data could only be entered after corrections
- School data was incomplete in some cases and so this posed a challenge when it came to entering deworming data into NEMIS.
- ECDEs and private schools were not well mapped which led to some logistical complications and institutions missing out on deworming either partially or entirely
- There were also schools that had not been planned for which turned up for teacher training sessions and requested to be included during deworming
- Some school enrolment numbers were not available at the time of planning during the sub-county training, so the information had to be sought later
- While deworming tablets were delivered on time and in the right quantities for the most part, there were concerns about the packaging. Tablets were sometimes stored in envelopes raising concerns about their efficacy and hygiene. This was due to tablets being packaged in tins of 1000, so repackaging was necessary, although suitable packaging materials were unavailable
- Time between teacher training and deworming day was short in some areas and therefore there was no adequate time for schools to prepare

Recommendations

- County governments need to improve ECDE data as well as mapping of schools
- Increase financial allocation for various activities which include airtime for data entry, stationery for the various trainings, and lunch and transport for trainees
- Revert to the training of 2 teachers per school and include ICT teachers in the training sessions to better handle data entry
- Allowances should be sent to the phones of participants directly whether it is for training (teachers and other trainees) or for drug distribution (sub-county pharmacists)
- MOE should fast-track issuance of NEMIS codes and a general improvement on the efficiency of the system.
- Allocate more time to training on NEMIS and DHIS systems for better understanding by participants.
- Ensure concurrent data entry into the systems to ensure error can be easily captured and resolved.
- Data quality checks should happen at the school level to ensure seamless data entry into both systems.

Key achievements of the last decade

58,245,293M treatments since 2012
37% annualised rate of return[4]

2012

1st NSBD Programme partnership agreement (2012-2017: MOE, MOH and Evidence Action). STH baseline prevalence of 33.6%, S. haematobium baseline prevalence of 18.0% and S. mansoni baseline of 2.4%

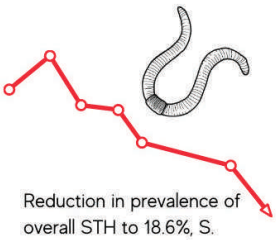
2013

Change from national to county-based Master Trainers in response to devolution, and programming

2014

Piloted the use of radio as a more effective community sensitisation tool

2015



Reduction in prevalence of overall STH to 18.6%, S. haematobium to 7.9% and S. mansoni to 1.7%

2016

Increased county-level programme ownership and in-kind contributions

2017

- 2nd Kenya School Health Policy
- Reduction of STH prevalence by 60.0% and S. haematobium prevalence by 97.9%

2018

Local procurement of deworming medicines, 2nd partnership agreement (2017-2022)

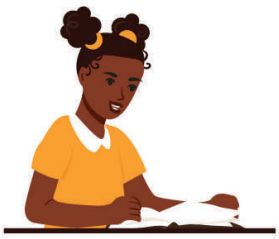
2019

Integration of programme treatment data into the MOH instance of DHIS

2020

E-data collection and SMS teacher reporting pilot conducted

2021



Resumed regular treatment after the reopening of schools post-Covid

2022

- Inter-ministerial government data ownership initiated using NEMIS and DHIS and integration of deworming data into the same
- STH prevalence reduced to 5.8%. Both species of SCH have experienced a very slight increase since 2018, S. mansoni has also experienced a slight increase since baseline (at 3.0%), S. haematobium has had a large reduction since baseline (at 2.2%)*
- STH moderate and/or heavy intensity infection has reduced from 9.9% to 1.3% across the NSBD programme area - which is low enough to declare NSBD programme as having eliminated STH as a public health problem based on WHO guidelines. Importantly only 19 of the 27 NSBD programme counties sit below 2% when looking at the county level. SCH remains slightly above the 1% threshold for EPHP.

Next phase of the programme implementation partnership (2022-2027)

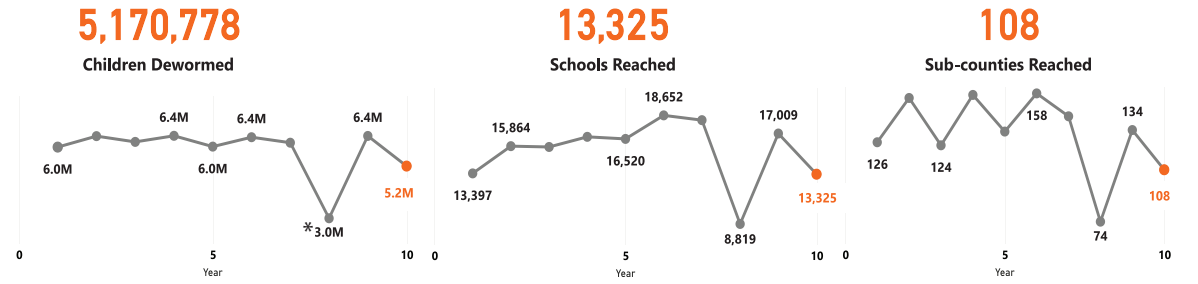
[4] Hamory, J., Miguel, E., Walker, M., Kremer, M., & Baird, S. (2020). Twenty Year Economic Impacts of Deworming. University of California

* The small increase indicates likely pockets of infection which have persisted during treatment disruptions due potentially to drug procurement issues COVID-19

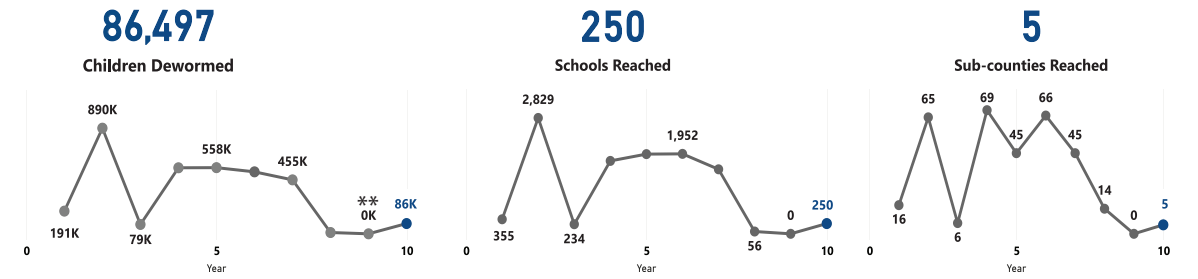
National School Based Deworming Programme
2012-2022 National Programme Results

Year 1-10 National Programme Results

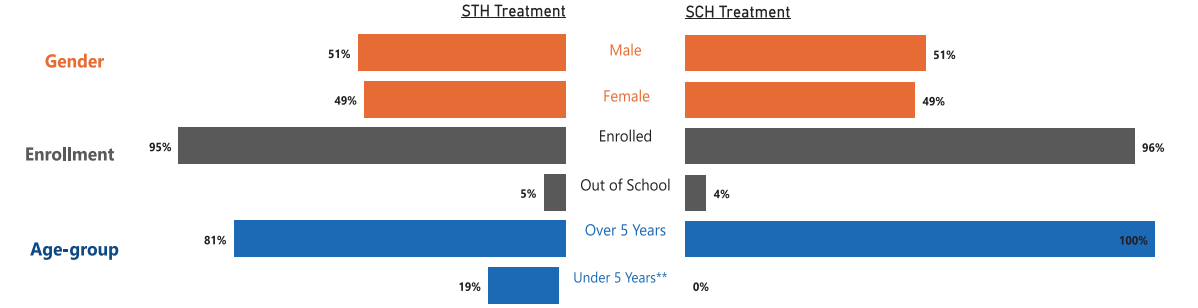
SOIL-TRANSMITTED HELMINTHS (STH) TREATMENT SUMMARY



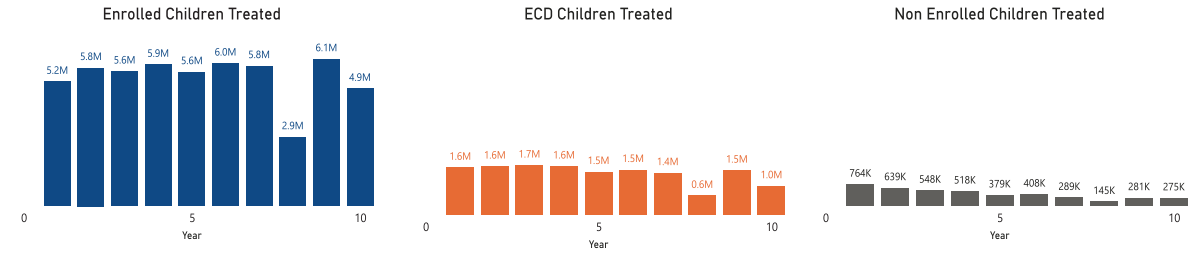
SCHISTOSOMIASIS (SCH) TREATMENT SUMMARY



COMPARISON OF TREATMENTS BY GENDER, AGE GROUP AND ENROLLMENT STATUS



TREATMENT TRENDS FOR SOIL TRANSMITTED HELMINTHS



* Due to the Covid-19 pandemic in 2020, programme activities were suspended as schools were closed. The programme had treated some of the targeted school population in March of that year but could not meet the annual target due to the mandated closure. This accounts for the lower than usual treatment numbers in Y8 (2019-2020).

** In Y9 (2020-2021) the programme did not treat for schistosomiasis due to drug procurement challenges. The decreasing treatment numbers over the years is due to treatment eligibility alongside unavailability of praziquantel. Note that schistosomiasis treatment is for children aged 6-14.

NATIONAL SCHOOL-BASED DEWORMING PROGRAMME NATIONAL PROGRAMME RESULTS

COUNTY	STH AND SCH COUNTY RESULTS			SUB-COUNTY	STH SUB-COUNTY RESULTS			SCH SUB-COUNTY RESULTS		
	Y1 (2012-2013)	Y5 (2016-2017)	Y10 (2021-2022)		Y1 (2012-2013)	Y5 (2016-2017)	Y10 (2021-2022)	Y1 (2012-2013)	Y5 (2016-2017)	Y10 (2021-2022)
BOMET	295,806 (85%)	288,149 (86%)	310,584 (95%)	Bomet Central	100,832	51,437	42,545			
				Bomet East		24,539	53,854			
				Chepalungu	61,997	74,921	74,962			
				Konoin	53,585	55,278	55,423			
				Sotik	79,392	81,974	83,800			
BUNGOMA	574,830 (75%)	610,156 (78%)	613,658 (86%)	Bumula	76,934	82,286	84,697			
				Bungoma Central	61,320	65,993	61,096			
				Bungoma East	91,986	47,911	40,513			
				Webuye West		51,839	51,544			
				Bungoma North	88,314	90,868	44,260			
				Tongaren			37,761			
				Bungoma South	80,727	67,732	94,469			
				Bungoma West	40,034	52,797	51,308			
				Cheptais	47,391	57,411	56,856			
				Kimilili Bungoma	53,593	57,619	57,981			
				Mt Elgon	34,531	35,700	33,173			
BUSIA	304,959 (80%)	329,959 (89%)	318,604 (87%)	Bunyala	24,643	26,934	27,872		21,109	22,410
				Busia	49,634	48,016	48,316		7,861	8,972
				Butula	50,951	54,244	53,315			
				Nambale	38,354	40,647	40,084			
				Samia	37,014	40,255	36,993		8,644	10,285
				Teso North	45,804	50,365	49,480			
				Teso South	58,559	69,498	62,544			
GARISSA		869 (36%)		Balambala		439			325	
				Ijara		430			302	
HOMA BAY	390,599 (70%)	412,220 (84%)	397,086 (80%)	Homa Bay	87,895	84,998	43,356		18,931	
				Rangwe			42,712			
				Mbita	40,186	47,138	36,752		19,726	
				Ndhiwa	78,741	81,262	82,084		5,687	
				Rachuonyo East	81,984	41,844	47,009		1,047	
				Rachuonyo South		48,685	48,793		4,229	
				Rachuonyo North	55,900	62,125	58,668		37,407	
				Suba	45,893	46,168	37,712		12,818	
KAKAMEGA	655,996 (80%)	679,122 (79%)	616,281 (75%)	Butere	53,887	57,225	55,989			
				Kakamega Central (Lurambi)	101,889	57,596	96,958			
				Navakholo		57,982	56,551			
				Kakamega East (Shinyalu)	60,183	62,572	21,034			
				Kakamega North (Malava)	87,110	90,228	45,356			
				Kakamega South (Ikolomani)	41,600	42,288	44,148			
				Khwisero	38,553	39,753	39,416			
				Likuyani	51,086	56,691	50,167			
				Lugari	46,025	43,803	45,733			
				Matete	32,353	29,012	27,416			
				Matungu	59,715	56,056	67,066			
				Mumias East	83,595	42,256	47,098			
				Mumias West		43,660	19,349			
KERICHO	285,463 (84%)	297,105 (90%)	275,033 (92%)	Belgut	79,201	47,979	35,205			
				Buret	66,029	63,192	60,495			
				Kericho	60,099	52,036	50,514			
				Kipkelion East	55,001	49,127	40,506			
				Kipkelion West		41,312				
				Londiani			45,311			
				Soin/Sigowet	25,133	43,459	43,002			
KILIFI	386,498 (83%)	348,150 (69%)		Chonyi						
				Ganze	59,652	50,373		9,838	7,393	
				Kaloleni	59,401	53,587		14,203	15,640	
				Kauma						
				Kilifi North	105,513	34,989		7,219	4,918	
				Kilifi South		54,871				
				Magarini	60,404	54,366		13,622	7,039	
				Malindi	69,235	74,633		4,680	1,530	
				Rabai	32,293	25,331		3,909	8,788	
KIRINYAGA	48,602 (94%)	49,606 (104%)	52,855 (86%)	Mwea East	21,871	26,167	29,843	19,337	21,177	25,128
				Mwea West	26,731	23,439	23,012	25,132	20,140	19,702
KISII	445,572 (78%)	475,058 (92%)	443,026 (93%)	Gucha	30,882	31,902	33,154			
				Gucha South	67,378	70,825	28,440			
				Etago			24,444			
				Kenyenya	54,374	52,862	50,430			
				Kisii Central	94,877	74,673	72,873			
				Kitutu Central		34,396	37,880			
				Kisii South	33,633	52,543	46,126			
				Marani	43,618	43,912	41,889			
				Masaba South	44,261	41,698	40,542			
				Nyamache	52,224	47,033	43,063			
				Sameta	24,325	25,214	24,185			

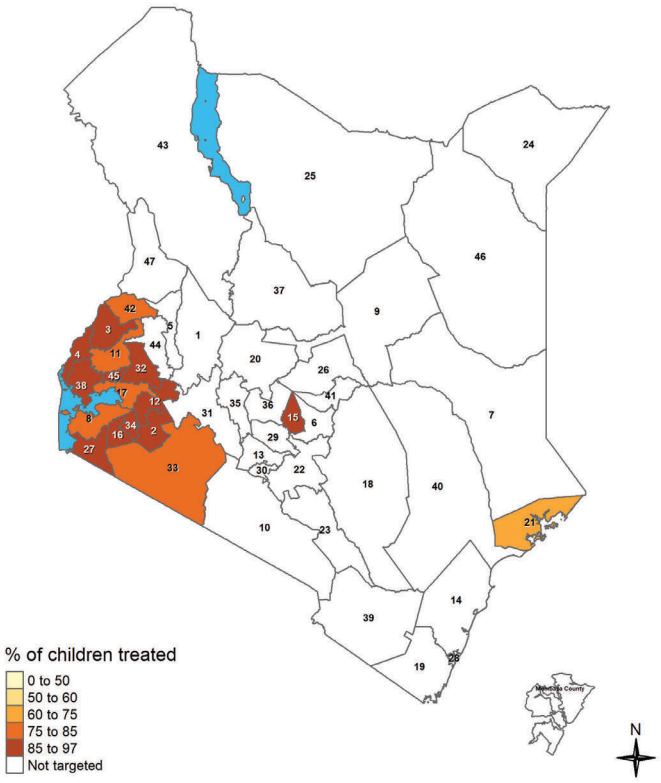
NATIONAL SCHOOL-BASED DEWORMING PROGRAMME NATIONAL PROGRAMME RESULTS

COUNTY	STH AND SCH COUNTY RESULTS			SUB-COUNTY	STH SUB-COUNTY RESULTS			SCH SUB-COUNTY RESULTS		
	Y1 (2012-2013)	Y5 (2016-2017)	Y10 (2021-2022)		Y1 (2012-2013)	Y5 (2016-2017)	Y10 (2021-2022)	Y1 (2012-2013)	Y5 (2016-2017)	Y10 (2021-2022)
KISUMU	325,997 (77%)	325,620 (75%)	361,733 (83%)	Kisumu Central	114,584	43,586	62,260		15,684	
				Kisumu West		44,359	51,553		14,084	
				Kisumu East	25,588	36,473	41,626		20,565	
				Muhoroni	46,022	52,490	55,181		7,110	
				Nyakach	55,704	57,730	54,430		5,518	
				Nyando	29,954	50,987	55,224		19,834	
				Seme	54,145	39,995	41,459		17,183	
KITUI		256 (72%)		Matinyani / Kitui West		256			219	
KWALE	222,952 (83%)			Kinango & Samburu	80,927			32,652	31,650	
				Kwale/Matuga	51,897			11,715	19,025	
				Lunga Lunga	90,128			24,438	22,423	
				Msambweni					10,609	
LAMU	34,904 (86%)	32,796 (75%)	31,276 (69%)	Lamu East	6,196	5,863	6,315			
				Lamu West	28,708	26,933	24,961			
MACHAKOS		203 (56%)		Yatta		203			176	
MAKUENI		343 (97%)		Mbooni East		343			343	
MIGORI	387,226 (82%)	422,242 (83%)	438,580 (85%)	Awendo	39,495	48,683	51,268			
				Kuria East	35,685	36,393	21,222			
				Kuria West	66,453	78,901	40,579			
				Mabera			34,178			
				Migori	94,869	106,331			24,647	
				Ntimaru			15,912			
				Nyatike	61,872	57,864	66,964		28,018	
				Rongo	40,361	48,064	47,807			
				Suna East			52,380			
				Suna West			55,047			
				Uriri	48,491	46,006	53,223			
MOMBASA	171,418 (71%)	221,725 (59%)		Changamwe	40,055	26,938				
				Jomvu		31,825				
				Kisauni	66,237	45,581				
				Nyali		40,319				
				Likoni	33,981	47,877				
				Mvita	31,145	29,185				
NANDI	145,264 (89%)	147,025 (98%)	130,469 (97%)	Nandi East	46,427	45,986	38,496			
				Nandi South	62,390	58,771	51,705			
				Tinderet	36,447	42,268	40,268			
NAROK	118,162 (88%)	122,676 (77%)	131,285 (78%)	Trans Mara East	47,861	49,863	53,212			
				Trans Mara West	70,301	72,813	78,073			
NYAMIRA	204,176 (77%)	209,144 (82%)	189,123 (93%)	Borabu	28,563	25,604	21,515			
				Manga	32,541	33,458	29,148			
				Masaba North	39,772	34,527	32,064			
				Nyamira North	54,233	60,684	55,269			
				Nyamira South	49,067	54,871	51,127			
SIAYA	293,452 (78%)	304,476 (77%)	316,560 (87%)	Bondo	47,582	52,761	56,676		19,299	
				Gem	56,510	58,957	61,984			
				Rarieda	53,522	46,564	50,651		34,789	
				Siaya	69,406	61,834	68,313		6,164	
				Ugenya	33,400	46,951	45,412			
				Ugunja	33,032	37,409	33,524			
TAITA TAVETA	81,081 (83%)	88,555 (92%)		Mwatate	21,635	21,280				
				Taita	11,291	14,374				
				Taveta	22,509	23,886		10,491	8,168	
				Voi	25,646	29,015				
TANA RIVER	55,862 (88%)	66,740 (56%)		Tana Delta	17,061	26,201			18,876	
				Tana North/Bura	17,438	19,938		7,528	4,712	
				Tana River/Galole	21,363	20,601		6,554	3,561	
TRANS NZOIA	318584 (82%)	331,653 (74%)	343,300 (78%)	Endebess	94,979	37,411	39,999			
				Kwanza		68,854	65,681			
				Kiminini	148,065	75,484	79,630			
				Trans Nzoia West / Saboti		68,010	79,595			
				Trans Nzoia East / Cherengany	75,540	81,894	78,395			
VIHIGA	205,795 (81%)	209,150 (84%)	201,325 (86%)	Emuhaya	65,109	32,010	32,756			
				Luanda		33,593	34,741			
				Hamisi	60,536	61,272	58,584			
				Sabatia	48,659	48,048	44,228			
				Vihiga	31,491	34,227	31,016			
WAJIR		388 (18%)		Buna		228			183	
				Eldas		160			135	
COUNTY TOTALS	**5,953,198 (79%)**	**5,973,386 (80%)**	**5,170,778 (85%)**	**Sub-county totals**	**5,953,198**	**5,973,386**	**5,170,778**	**191,318**	**557,686**	**86,497**

Areas not treated based on eligibility criteria

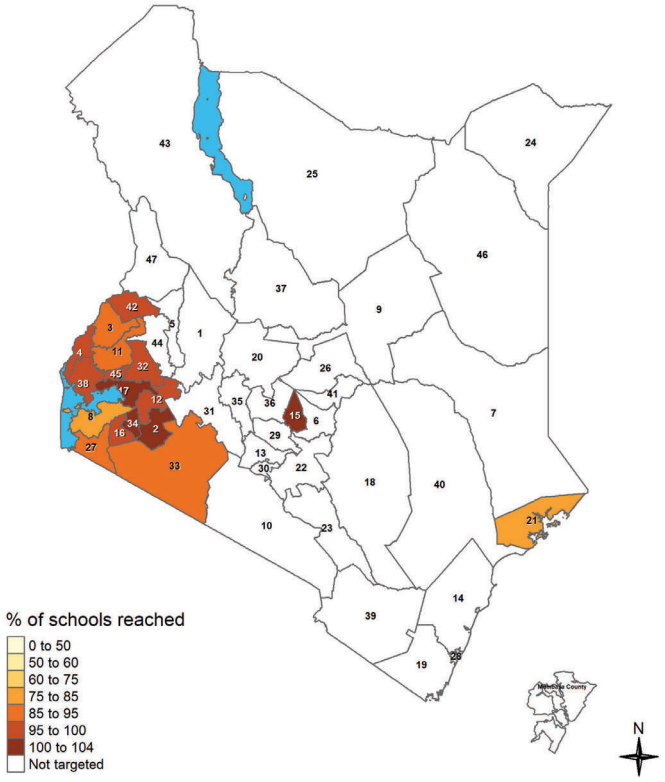
Areas not treated based on eligibility criteria

DtW Kenya; % of children treated in Y10



NO	COUNTY
2	Bomet
3	Bungoma
4	Busia
8	Homa-Bay
11	Kakamega
12	Kericho
15	Kirinyaga
16	Kisii
17	Kisumu
21	Lamu
27	Migori
32	Nandi
33	Narok
34	Nyamira
38	Siaya
42	Trans-Nzoia
45	Vihiga

DtW Kenya; % of School reached in Y10



Y10 (2021-2022) Impact Assessment Survey

The Kenya Medical Research Institute (KEMRI) is the national body responsible for carrying out human health research in Kenya, and is a key partner in the National School-Based Deworming (NSBD) Programme. Through its renowned international experts in STH and schistosomiasis research, KEMRI provides support in mapping, parasitological analysis, implementation research, and impact evaluation. KEMRI's Eastern and Southern Africa Centre of International Parasite Control (ESACIPAC) has conducted repeat cross-sectional school-level surveys assessing prevalence and intensity for three types of STH (hookworm, whipworm—specifically *Trichuris trichiura*, and roundworm— specifically *Ascaris lumbricoides*) and schistosome infections (*Schistosoma mansoni* and *Schistosoma haematobium*) in school-age children. Results from this work guide programme decisions and help NSBD maintain its evidence-based approach. During year 9 of the NSBD programme implementation, KEMRI performed a monitoring and evaluation (M&E) survey in 200 schools in the 27 NSBD counties spread across six regions of the country. The survey design and analysis were based on a novel approach - model-based geostatistics (MBG) - of sampling children and schools to give a geospatially representative sample of schools within each county.

The results showed that after 10 years of consistent deworming, the overall prevalence of STH reduced to 5.8%, from a baseline of 32.3%, an 82.0% rate reduction, and approaching WHO recommended prevalence levels for treatment suspension (less than 2%). Species specific prevalences were 4.3% for *Ascaris lumbricoides*, 1.4% for *Trichuris trichiura* and 0.3% for hookworm. Importantly, after 10 years of deworming, the prevalence of moderate or heavy intensity infections (as indicated by the total number of worms within an individual child) is now below 2%, indicating a very low level of morbidity associated with STH in the NSBD area. This metric, defined by the WHO, indicates that a geography has Eliminated STH infection as a Public Health Problem (EPHP). The average NSBD intensity covers 19 counties with intensity below 2%, however, 8 which are yet to reach this threshold. The trend in overall prevalence from baseline to Y9 evaluation is shown in figure 1 below.

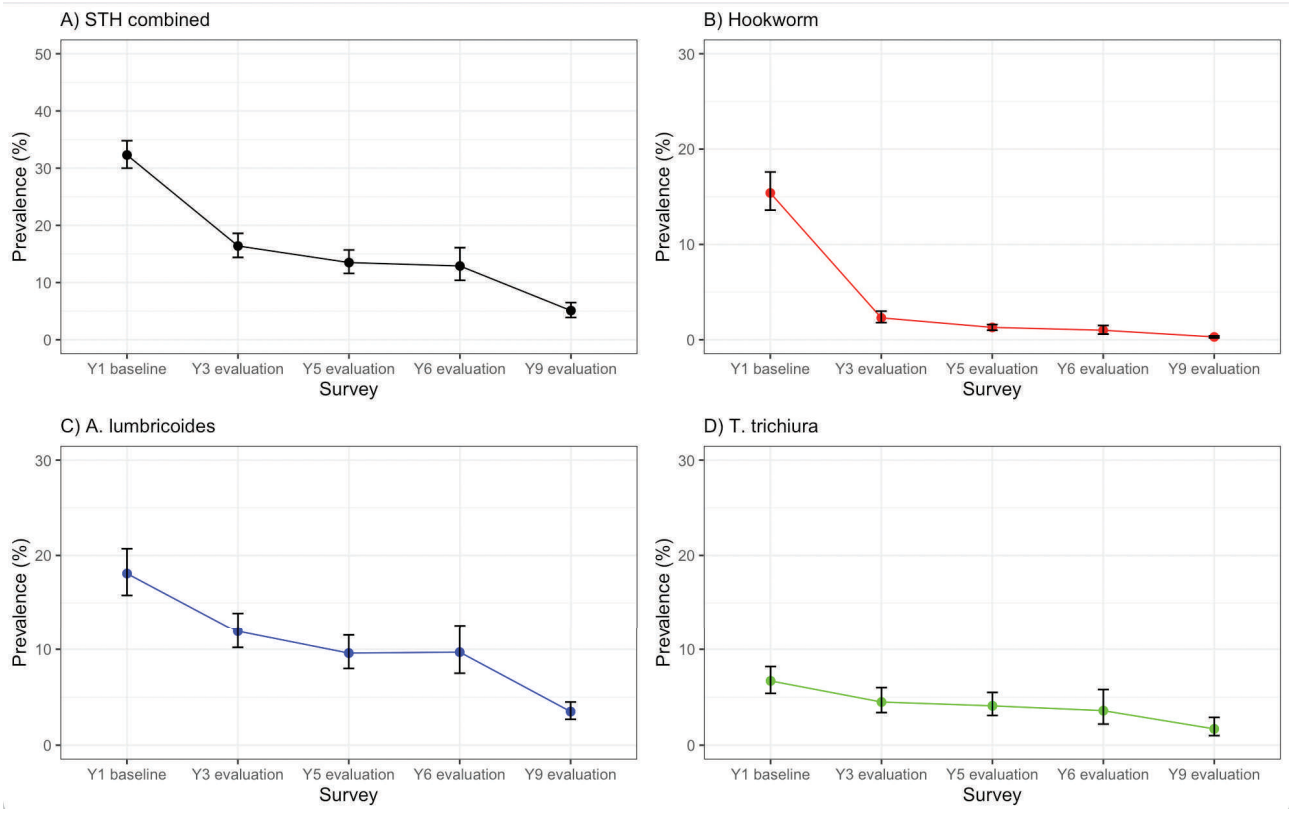


Figure 1: Showing trend in STH overall prevalence since baseline

After 10 years of deworming, the overall schistosomiasis prevalence is 3.0% for *Schistosoma mansoni* and 2.2% for *Schistosoma haematobium*. This is from a baseline of 2.4% and 18.0% respectively, however both species have experienced a slight increase since evaluation in 2018. The small increase indicates likely pockets of infection which have persisted during treatment disruptions due potentially to drug procurement issues and disruptions due to COVID-19. The trend in overall prevalence from baseline to Y9 evaluation is shown in figure 2 below.

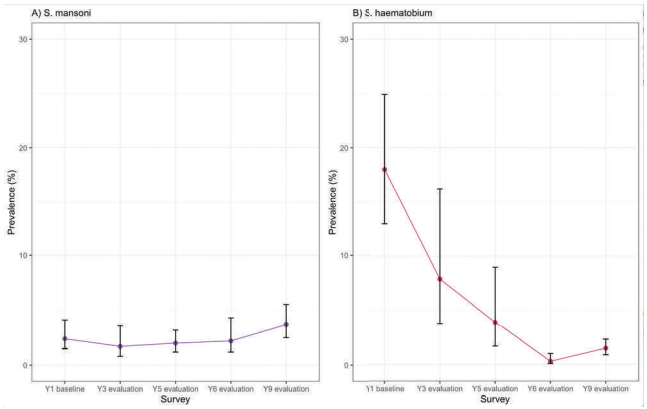


Figure 2: Showing trend in schistosome overall prevalence since baseline

Analysis by county indicated that STH prevalence ranged from 0.7% to 16.9% for any STH, 0.2% to 14.2% for *A. lumbricoides*, 0.1% to 5.6% for *T. trichiura*, and 0.2% to 0.5% for hookworm. Based on WHO recommendation for varying MDA frequency after 5-6 years, ten counties had below 2% of any STH prevalence and could consider suspending preventive chemotherapy (PC), ten counties had any STH prevalence between 2% to 10% and would require PC once after every two years, and seven counties had any STH prevalence between 10% to 20% and would require PC once a year. The geographical distribution of the mean STH prevalence per sub-county is shown in figure 3 below.

Similarly, analysis by county indicated that schistosome prevalence ranged from 0.1% to 17.5% for *S. mansoni*, and from 0.1% to 15.4% for *S. haematobium*. Based on WHO recommendations for varying MDA frequency after 5-6 years, two counties may consider suspending, twenty-two counties require PC once after every two years and three counties require PC once a year. The geographical distribution of the mean schistosome prevalence per sub-county is shown in figure 4 below.

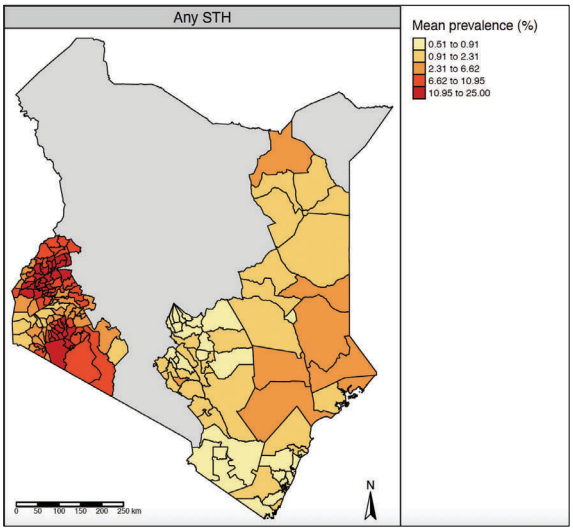


Figure 3: Sub-county level geographical distribution of STH infections

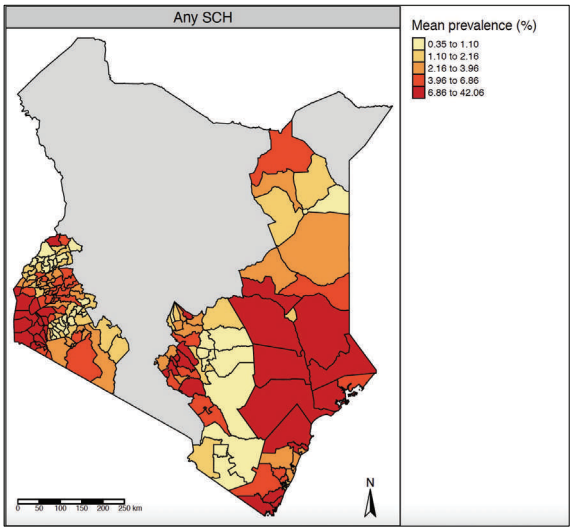


Figure 4: Sub-county level geographical distribution of schistosome infections

In conclusion, our analysis showed that infection prevalence and intensity, particularly STH, has gone down over the years due in large part to consistent treatment, however, not to a level where they are no longer a public health problem uniformly across all counties. We noted a slight increasing trend in schistosome prevalence which requires further investigation. Due to the varying levels of infections in each county and the over ten years of NSBD annual treatment delivery strategy, the programme should adopt county-level treatment frequencies (or consider lower geographic demarcation to sub-county) based on the WHO prevalence categorization.

When considering county level treatment frequencies, 10 and two counties may consider suspending treatment for STH and SCH respectively. In addition, 10 and 22 counties may consider treatment once every two years for STH and SCH respectively. Considering treatment frequency has been annual up until this point of the program, this represents a considerable reduction in resources due to the success of the program.

Integration of Treatment Data into NEMIS and DHIS

Introduction

Data collection and entry have evolved to accommodate the changing needs of programme stakeholders. In Y10 (2021-2022), the reverse cascade for treatment data forms was revised to allow for data entry into official government systems at both the Ministry of Health and the Ministry of Education. This addressed the concerns of delays in the availability of final data and the lack of a centralised repository of treatment data that can be easily accessed by all stakeholders.

Teachers filled out the data on forms MOH517A and MOH517B and the headteachers summarised these on the MOH517C (3 copies). Headteachers then input the treatment data into the NEMIS platform. The Curriculum Support Officers (CSOs) collected the 2 sets of the summary forms MOH517C and gave them to the Sub-County NEMIS officers who then gave 1 set to Health Records and Information Officers (HRIOs). The HRIOs input the data into a DHIS instance created for the programme.

This improved reverse cascade process has resulted in

- an increase in accuracy of data. This was due to the validation rules that were in place in the systems
- reduced delivery timelines. We were able to get data from a huge proportion of the schools in the first 2 week as the responsible teams had access to the systems and data entry happened right after deworming
- greater accessibility by stakeholders to the treatment data. There are in built dashboards in the systems to be able to track and follow the data entry process by all the stakeholders

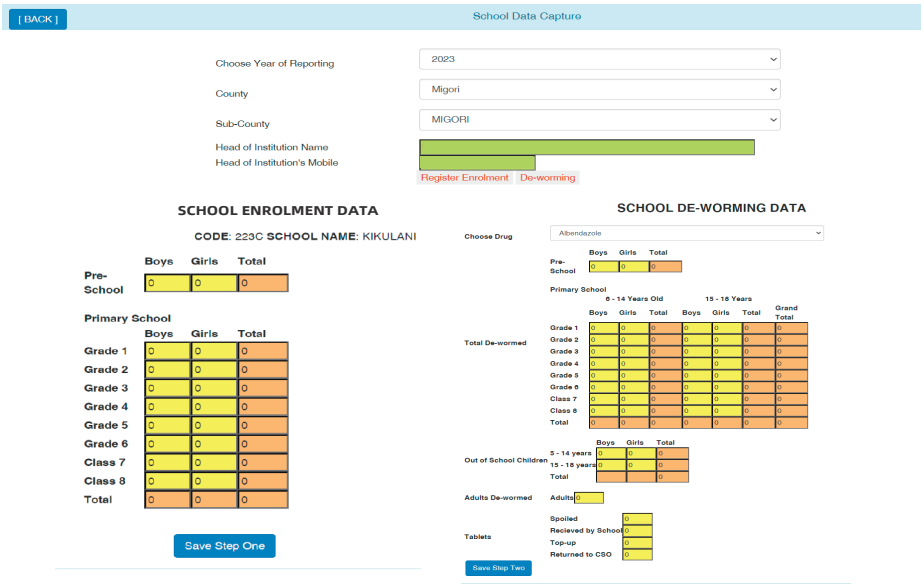
Data entry into NEMIS

The National Education Management Information System (NEMIS) is a web-based data management solution that collects data from educational institutions and processes and reports the status of set indicators. Every school in a county must be registered by the County Director of Education on the NEMIS platform and receive a Unique Institution Code (UIC) that serves as their institution's NEMIS Code. Headteachers must update all information about the school and register every learner.

In 2020 and 2021, data from the sub-county was entered by NEMIS officers into Census and Survey Processing System (CSPro) a data collection platform for the programme. The system was used as a means to collect data electronically as we explored other data collection options. NEMIS was officially adopted in Y10 where head teachers were trained on a web-based and an android application for data entry.

To enter Form MOH517C, an instance in NEMIS was created. The form was divided into two sections capturing enrolment and treatment data respectively for both Albendazole and Praziquantel tablets.

School Enrolment Data



Deworming Data

During deworming day, learners from both registered and unregistered schools were dewormed. The Sub-County directors were given the permissions to add the unregistered schools (both ECDE and Primary) under a new instance created specifically for the program so as to collect data from all schools. Data entry was monitored in the system by the SCDE and NEMIS officers within their respective sub-counties.

DHIS

All stakeholders within the NSBD have worked over the years to improve on the processes of data collection, analysis and presentation geared towards data-informed decision making. Various options were piloted to counter the challenges around quality and timely availability of treatment data to stakeholders at all levels. HRIOs were trained on electronic entry of data into CSPro for the programme in Y8 (2019-2020) and Y9 (2020-2021) and this was not without its challenges. It became increasingly necessary to implement the entry of deworming data into the DHIS system to improve on timelines for Cabinet Secretary (CS) and Principal Secretary (PS) performance contract reporting as well as timely availability of data to all stakeholders.

System Overview

District Health Information Software (DHIS) is a web-based software package built with free and open-source frameworks for collection, validation, analysis and presentation of aggregate data. It is a generic tool that needs configuration in every new context-implementation. Its core features make it ideal to support in the collection of deworming data at the school level including the provision to either be in standard lists or tables or to be customised to replicate paper forms. This makes the transition from paper to DHIS easier.

Within DHIS there are different data validation tools that can be used to ensure data received is of good quality. In addition, DHIS provides easy to use one-click reports with charts and tables for selected indicators or summary reports using the design of the data collection tools and allows for integration with popular external report design tools to add more custom or advanced reports. These reports are supported by the comprehensive data management system that DHIS offers, supporting analysis at the different levels from school level all the way to the national level.

Data Entry into DHIS

Process

The Division of Health Informatics team from the Ministry of Health alongside Evidence Action undertook the creation and customization of the form MOH517C into DHIS. This was done as below:

- **School List Cleaning and Uploading:** A comprehensive list of registered schools provided by the Ministry of Education was uploaded into the system before development and deployment. Schools that had been deworming but were not registered were also identified and updated. This inadvertently provided an opportunity for the Ministry of Education to push for these schools to register
- **Integrating form MOH517C into DHIS:** The Ministry of Health took the lead in replicating the form MOH517C into DHIS and it was designed to mimic the paper form. The form was split into STH and SCH forms to track both and a form was assigned to each school as data entry was happening at the school level. In addition to the treatment numbers, Head teacher details were collected for ease of follow up as necessary

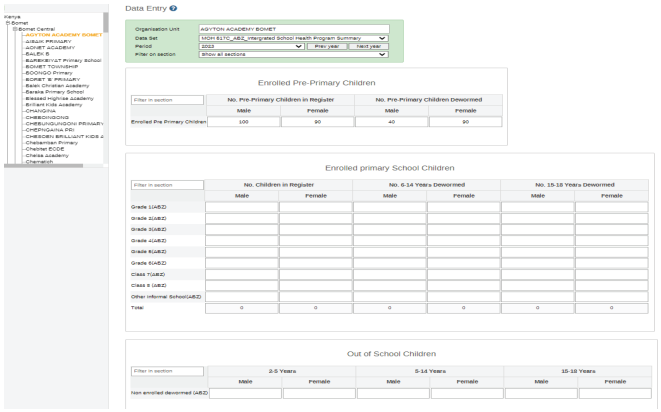


Fig 1: Form 517c

- **Creation of validation rules in DHIS**: In a bid to ensure that the data entered was complete and correct, data validation rules were developed into DHIS. Some sections such as the totals were auto-filled by the system to reduce data entry errors as well as the time taken to fill the forms
- **Creation of reports in DHIS:** Key indicators were identified and programmed into the systems. These were then collated and reports at the different levels were generated. These reports included submission rates as well as dashboards showcasing the treatment numbers

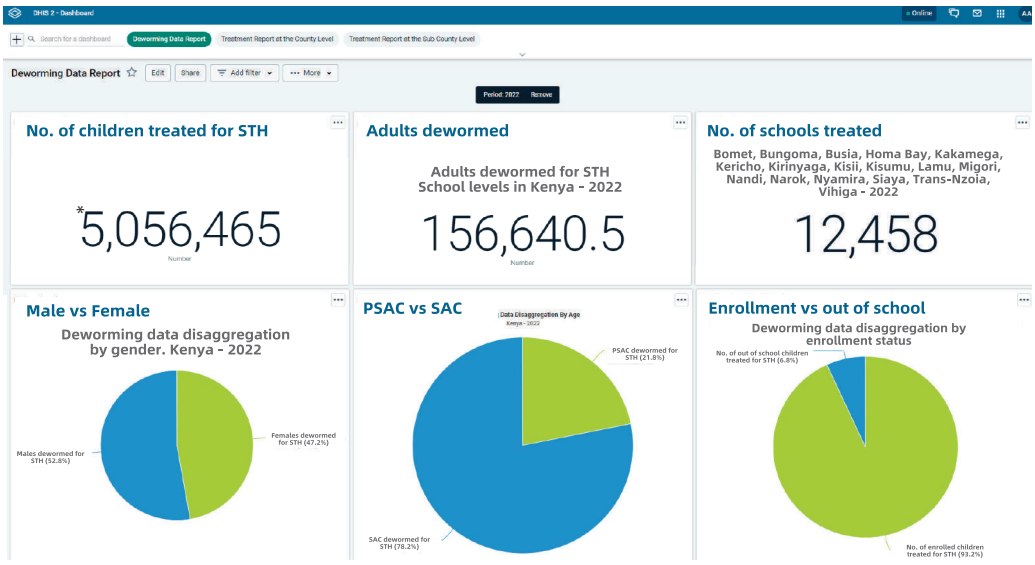


Fig 2: Dashboard showing treatment reach (children, sub-counties, and schools) and the disaggregation by gender, age, and enrolment

Treatment Report at the County Level

County Deworming Data

	County Deworming Data																						
	This year																						
	Pre-Primary Females In Register	Pre-Primary Males In Register	Pre-Primary In Register	Pre-Primary Females Dewormed for ABZ	Pre-Primary Males Dewormed for ABZ	Pre-Primary Dewormed for ABZ	Primary Females In Register	Primary Males In Register	Primary In Register	Primary Females Dewormed for ABZ	Primary Males Dewormed for ABZ	Primary Dewormed for ABZ	Pre_Primary Out of School Children Dewormed for ABZ	Primary_Aged Out of School Children Dewormed for ABZ	No of Out of School Female Children Treated for STH	No of Out of School Male Children Treated for STH	No of Out of School Children Treated for STH	No of Children Treated for STH	MOH 517C_ABZ_Adults Dewormed	Tablets Received	MOH 517C_ABZ_Tablets Spoiled	MOH 517C_ABZ_Tablets Returned to CSO
Bomet	29,525	30,805	60,330	27,784	29,110	56,894	110,068	115,950	225,418	106,981	123,925	230,906	18,367	9,347	8,953	18,761	27,714	314,914		305,646	2,757	3,096
Bungoma	52,115	53,396	105,511	49,246	49,940	99,186	248,066	246,328	494,394	227,756	260,710	488,466	33,234	22,213	28,109	27,338	55,447	643,099		686,238	8,267	32,010
Busia	27,918	27,904	55,822	26,146	26,286	52,432	123,927	124,388	248,315	120,166	133,394	253,560	15,369	7,716	13,082	10,003	23,085	329,077		344,678	4,353	8,996
Homa Bay	36,706	37,944	74,650	33,780	35,097	68,877	129,005	134,487	263,492	122,907	143,359	266,266	11,420	7,854	9,558	9,716	19,274	354,417		377,871	4,947	18,236
Kakamega	45,134	45,862	90,496	41,708	42,315	84,023	211,577	217,211	428,788	198,284	225,629	423,913	20,536	13,183	17,182	16,537	33,719	541,655		584,471	5,749	22,387
Kericho	24,847	26,044	50,891	23,743	24,849	48,592	99,165	104,935	204,100	96,086	113,007	209,093	7,167	7,115	7,088	7,194	14,282	271,967		281,191	2,215	3,950
Kirinyaga	5,593	6,013	11,606	5,030	5,446	10,476	20,965	22,013	42,978	19,962	23,746	43,708	926	1,227	1,111	1,042	2,153	56,337		96,725	788	3,521
Kisii	39,439	39,735	79,174	36,604	38,225	74,829	149,977	151,270	301,247	143,733	164,686	308,419	14,179	8,845	11,715	11,309	23,024	406,272		417,475	4,359	10,382
Kisumu	35,307	40,810	76,117	31,503	32,365	63,868	145,382	146,390	291,772	135,382	153,703	289,085	11,786	7,567	9,553	9,800	19,353	372,306		403,092	5,239	23,479
Lamu	1,580	1,768	3,348	1,424	1,631	3,055	6,955	7,510	14,465	6,426	7,309	13,735	272	139	213	198	411	17,201		21,851	458	2,979
Migori	57,230	46,501	103,731	42,329	43,210	85,539	163,128	164,500	327,628	152,931	171,288	324,219	16,251	16,625	16,681	16,195	32,876	442,634		502,670	7,909	35,852
Nandi	11,777	12,561	24,338	11,349	12,050	23,399	49,856	53,101	102,957	48,562	57,637	106,199	3,697	1,303	2,443	2,557	5,000	134,598		139,672	1,024	2,236
Narok	7,131	7,319	14,450	6,606	6,815	13,421	28,405	29,274	57,679	26,875	30,663	57,538	2,245	1,542	1,831	1,956	3,787	74,746		88,446	712	2,291
Nyamira	17,854	18,536	36,390	17,170	17,694	34,864	74,931	76,039	150,970	69,484	83,432	152,916	8,472	5,018	6,714	6,776	13,490	201,270		212,186	4,395	4,496
Siaya	27,561	28,503	56,064	25,520	26,397	51,857	125,274	129,655	254,929	119,583	137,763	257,346	9,366	7,346	8,435	8,277	16,712	325,915		343,310	3,675	14,499
Trans-Nzoia	28,255	29,796	58,051	26,731	27,772	54,503	134,560	137,857	272,417	127,913	146,700	274,613	15,731	12,509	14,542	13,698	28,240	357,356		374,438	3,374	8,396
Vihiga	16,838	17,489	34,327	16,305	16,691	32,996	79,468	81,150	160,618	76,286	87,195	163,481	6,912	3,262	5,204	4,970	10,174	206,651		217,400	2,353	6,284

Fig 3: Tabular format of the treatment numbers at the county level

Training of end users and roll-out

The HRIOs at the sub-counties are responsible for data entry into the system and were invited for training on the same at the County. Each county training took one day and was spearheaded by the health informatics team and supported by Evidence Action team. The training was fairly smooth as the team had prior knowledge of the DHIS system. Unique login credentials for each county and sub-county were provided during the training. About a week after the deworming exercise was completed, data started trickling in, first into NEMIS for about a month and then into DHIS. When data entry into DHIS commenced, there was a spike in the number of schools that had data entered into DHIS. In the 3rd and fourth weeks post commencement of data entry into NEMIS, data entry slowed down significantly.

In 2023, with lessons learned we expect to have smoother roll out with HRIOS having already been familiarised with the systems.

* Data entry for Y10 was done at the school level by MOE into NEMIS and sub county level by MOH into DHIS. The numbers in DHIS do not indicate the final reported treatment numbers as some schools reported on NEMIS but not on DHIS. A data comparison was therefore done to come up with the final reported numbers that are higher than those reported in the DHIS instance.

Evidence
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