

**Kenya National School
Based Deworming Programme
Year 4 Results
(2015-2016)**

Message from the Ministry of Education



The vision of the Ministry of Education is the provision of quality education and training for sustainable development. In order to realize this vision, all Ministry programmes are anchored on international, regional and national commitments. These commitments have been factored in the Ministry's legal, policy and strategy documents. The achievement of Education for All (EFA) goals is a key priority in the National Education Sector Plan (NESP) 2013-2018.

The NESP recognises that improved health and nutrition increases enrolment and stabilises attendance. The Ministry of Education works alongside other stakeholders under the umbrella of the National School Health Policy 2009 (currently under review) to roll out a comprehensive school health programme that develops and strengthens inter-sectoral partnerships between health, education, the community, children, and other stakeholders.

The comprehensive school health programme provides and/or supports the provision of targeted school-based health services to school-aged children at risk. School-based deworming, being one such initiative, has been carried out successfully over the past four years. Last year it reached over 16,000 primary schools across the country, in two waves. This success is, without question, due to the unique collaboration between the Ministries of Education and Health.

The Ministry of Education is proud to celebrate the deworming of over 6.4 million children in the fourth annual round of deworming which is in turn a fulfilment of the performance contract of the ministry. The successes of the programme have been unmatched and it is no surprise that the country is seen as a model for other countries to learn from. Having a programme exceed its targets year after year can only be attributed to effective partnerships with dedicated stakeholders.

I want to thank the teachers in this country whose immense contribution to this programme ensured its success. It is teachers who are trained to take this programme to its last mile. I also thank the other personnel from the two collaborating ministries, both from the national government and the counties. I acknowledge the efforts of the County Directors of Education and the staff of the School Health, Nutrition and Meals Unit, who have invested in this programme. May I also thank the Principal Secretary of the Ministry of Health and his staff for enabling close collaboration with the Ministry of Education.

We also wish to extend our gratitude to all other participants in this great achievement, beginning with the drug donors, Merck and GlaxoSmithKline. They have never failed in their commitment to provide free deworming drugs to the children of this country. We would also like to thank Evidence Action for providing fiscal management and administrative support to the donors.

We are proud to be associated with this world-renowned programme.
Kwa Afya na Elimu Bora, Tungamize Minyoo!

Dr. Belio Kipsang, Principal Secretary, Ministry of Education

Message from the Ministry of Health



The physical health of a citizenry has a direct effect on the social and economic indicators of a nation. In Kenya, as elsewhere, health and education are the main pillars in society that determine the potential of individuals to contribute significantly to the economy. School-aged children make up about 42% of our total population and ill health is an impediment to their achieving their full potential.

The importance of this programme to the Ministry cannot be overstated. For the last four years, deworming has been prioritized as one of the Key Performance Indicators (KPIs) of the Ministry. It is in our performance contract that we will effectively provide deworming treatment to our children in schools. We take pride that this cost-effective programme not only improves children's health but also educational outcomes. We know we are contributing to the development of human capital for our economic growth.

The Ministry of Health is delighted today to celebrate with partners the successful completion of the fourth annual round of treatment and to release the results of the same. This year, the programme treated over 6.4 million children in over 16,000 schools in 27 counties, surpassing its target of 5.7 million children. This is an increase over the 6.2 million children that were treated last year. We recognize the efforts all partners who contributed toward making this programme a success.

We are grateful for the unique relationship that we have with the Ministry of Education. The focus over the last year has been institutionalisation of the programme and we have made significant progress. The programme, being of great importance, must continue to be embedded in the structures of the Ministries under the integrated school health programme.

We continue to offer our unequivocal appreciation to the pharmaceutical companies, Merck and GlaxoSmithKline, who have over the years donated drugs through the World Health Organisation (WHO) that are the backbone of the programme. We must also thank our development partners: The Children's Investment Fund Foundation (CIFF), the END Fund, and Evidence Action.

We would like to appreciate the work of the programme management team, the county, sub-county and division level health and education personnel and, very importantly, the teachers for the exceptional results of their hard work. Without these individuals, the children of Kenya would not have had improved health and in turn, improved education. Final appreciation goes to parents for allowing their children to receive this treatment. We encourage them to keep doing so.

Thank you all for the hard work and dedication that has gone into ensuring continued success of the programme.

Kwa Afya na Elimu Bora, Tunagamize Minyoo!

Mr. Julius Korir, CBS, Principal Secretary, Ministry of Health

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Abbreviations

CIFF	The Children's Investment Fund Foundation
CSO	Curriculum Support Officer
ECD	Early Childhood Development
EFA	Education for All
ESACIPAC	Eastern and Southern Africa Centre of International Parasite Control
KEMRI	Kenya Medical Research Institute
KPLs	Key Performance Indicators
MDA	Mass Drug Administration
MOE	Ministry of Education
MOH	Ministry of Health
NESP	National Education Sector Plan
NTD	Neglected Tropical Diseases
SCDE	Sub County Director of Education
SCMOH	Sub County Director of Health
STH	Soil Transmitted Helminths
WASH	Water, Sanitation and Hygiene
WHO	World Health Organisation

Overview of the National School-Based Deworming Programme

The National School-Based Deworming Programme is a government programme implemented by the Ministry of Education (MOE) and the Ministry of Health (MOH). The goal of the programme is to remove parasitic worms as a public health problem for children in Kenya. The programme's aim is to treat at least 5.5 million Kenyan children each year for five years (2012-2017). It targets all children aged 2-14 years in at-risk sub-counties, regardless of primary school enrolment.

In Kenya, more than 5 million school-age children are at risk of intestinal parasitic worms, including soil-transmitted helminths (STH) and schistosomes, which have a negative impact on their health and education. The Government of Kenya recognizes that the health and education of its children are key in building a bright future. As such, it has made deworming a national priority through the National School-Based Deworming Programme.

The deworming programme has operated successfully since 2009, when 3.6 million children were dewormed. Following the success of the first round of implementation, the programme was expanded to a national programme in 2011 and has since dewormed 5.9 million, 6.4 million, 6.17 million and 6.4 million children in 2012-2013, 2013-2014, 2014-2015 and 2015-2016, respectively.

Treatment takes place in schools across at-risk areas endemic for parasitic worms. Selection of these areas is determined according to World Health Organisation (WHO) criteria.

Regularly providing deworming tablets to children through schools is a proven, cost-effective and safe treatment strategy due to the readily available, extensive and sustained educational infrastructure. WHO has certified the safety of administration of deworming tablets by teachers with support from the local health system.

While initiated and managed at the national level, the National School-Based Deworming Programme is implemented at the county level. Personnel from the two ministries play a joint leadership role in ensuring that the programme is implemented in every school within the targeted treatment areas. More details of the implementation model can be found on pages 11-13.

The programme is embedded in several existing policies of the Government of Kenya that guide its alignment with national priorities and infrastructure that promotes its sustainability. These include:

- *National School Health Policy and Guidelines* (2009) (currently under review), which prioritizes deworming under the thematic area of disease prevention and control
- *The 2nd Kenya National Strategic Plan For Control of Neglected Tropical Diseases* (2016-2020), which identifies school-based deworming as one of the treatment strategies for the control of worms and bilharzia.

Along with these policies, the programme is also an initiative under the National School Health Programme at the Ministries of Health and Education, which is aimed at promoting the health and educational development of pupils and the health of the community.

The programme is implemented with technical and administrative support from the Deworm the World Initiative at Evidence Action which advocates for school-based deworming and provides technical assistance to launch, strengthen and sustain school-based deworming programmes. The organisation works directly with governments to rapidly scale deworming programs targeting all at-risk school-age children. For more information about Deworm the World Initiative, please visit www.evidenceaction.org/dewormtheworld.

Financial support for the programme has been provided by the The Children's Investment Fund Foundation (CIFF) and The END Fund. The deworming medicines are part of WHO's international medicine donation programme. These medicines (albendazole and praziquantel) are provided free of charge to the Ministry of Health through GlaxoSmithKline and Merck respectively.

Critical factors for the success of National School-Based Deworming Programme

The National School-Based Deworming Programme is a unified national programme, coordinated at national level with collaborative participation of Ministries of Health and Education and their partners. This catalytic partnership has resulted in a strong programme partnership agreement involving MOE, MOH, CIFF, END Fund, WHO, Kenya Medical Research Institute (KEMRI) and Evidence Action. These partners have facilitated and overseen four consecutive annual mass deworming rounds that target all at-risk school-age and preschool-age children.

The evidence-based programme design is informed by results from continuous process monitoring, treatment data management, and annual prevalence and intensity surveys conducted pre- and post-deworming to understand changes in infection patterns. Targeting children through schools effectively reaches over 80% of the target population in all at-risk geographies in the country. Through the school-based programme, trained and trusted primary school teachers administer deworming medicines to children from as young as 2 years. The programme leverages the existing and extensive infrastructure of schools where children are easily accessed and managed.

Deworming medicines are safe, available and easy to administer by trained teachers. Children who are not enrolled in school are encouraged to participate in the deworming exercise through various community mobilization channels including interpersonal communication, mass media and information, education, and communication materials targeting parents, teachers and children. The government of Kenya leads and owns the programme through the programme governance structures and the contribution of significant in-kind resources through the provision of education and health staff at all levels.

Challenges faced in implementation of the programme

Though the programme is a success overall, implementation is not without challenges. Different counties have varying governing systems making timing of activities difficult. The ideal would be a national deworming day across all treatment areas, but this is not possible because of competing priorities and programmes within counties.

The overarching goal of the programme is to eliminate worms as a public health problem for children in Kenya. However, even with annual treatment covering over 80% of the target population, there is still the problem of recrudescence as seen from KEMRI's prevalence surveys. There is need for other interventions to come into play such as Water, Sanitation and Hygiene (WASH) programmes to permanently lower worm prevalence.

The programme has run for four consecutive years and it is, in every sense, a government programme. Evidence Action has provided technical assistance, process monitoring and coverage validation, and fiscal management and administrative support, and has worked towards ensuring that the lowest possible cost is incurred to deworm each child. With the programme coming to the end of its first five-year cycle in mid-2017, conversations are underway about the programme's future structure, governance, and financial sustainability. The government is keen to have the programme continue for at least another five years.



Working Towards the Elimination of Worms in Kenya: The TUMIKIA and TakeUp Projects

Building on the success of the National School-Based Deworming Programme, the Government of Kenya is keen to reach other members of the community also infected with worms and wants to learn whether combining school- and community-based deworming is a more effective method of controlling and ultimately eliminating intestinal worms in Kenya compared to school-based deworming alone.

This hypothesis is being tested through the TUMIKIA Project (Tuangamize Minyoo Kenya Imarisha Afya, which from Swahili loosely translates to “Let us eradicate worms in Kenya to improve health”). This is a trial conducted by KEMRI in collaboration with the Ministry of Health and the London School of Hygiene & Tropical Medicine. The two-year trial is being conducted in coastal and western Kenya, leveraging the NSBDP to strengthen the evidence base surrounding STH control and elimination. It is scheduled to be completed in mid-2017. To learn more about the TUMIKIA Project, please visit <http://www.thiswormyworld.org/tumikia-project>.

Evidence Action, in collaboration with the Ministry of Health, is testing the feasibility, scalability, and cost-effectiveness of stimulating the take-up of deworming treatment using social and behavioral incentives among adult community members. The study, called TakeUp, is a randomized controlled trial and has been implemented in three counties of western Kenya. Analysis is underway and the forthcoming results will provide insights around the potential utility of social incentives in maximizing treatment coverage throughout communities.

Extending Deworming Beyond Kenya

With the sustained registered successes of the National School-Based Deworming Programme, the Deworm the World Initiative has worked to extend deworming beyond Kenya and applied lessons learned to additional countries in need.

Deworm the World was able to facilitate collaboration as well as apply best practices and lessons learned from Kenya to a program run by the Government of Ethiopia. Government officials from the Federal Ministries of Health and Education as well as members of the Ethiopian Public Health Institute visited the Government of Kenya (the Ministries of Health and Education and KEMRI) to learn more about Kenya’s practices in the areas of policy development, budgeting, community sensitization strategies and independent monitoring.

Evidence Action works with the government of Cross River State in Nigeria to establish the school-based component of an integrated Neglected Tropical Diseases (NTD) program, in partnership with RTI International, which supports the community-based component. The Kenya deworming team supported new team members in Nigeria and state government officials, providing input on the cascade design, training and community sensitization materials, and independent monitoring. Evidence Action is proud to share lessons learned from Kenya’s strong deworming programme with implementing government ministries in Kenya, Ethiopia, Nigeria, India, and Vietnam.

Lessons learned from the programme, studies and other countries

The past four years have offered programme partners an opportunity to improve over time in terms of relevant participation at various levels, better fiscal management, improved working relationships among partners and responsiveness to feedback received from implementers. The lessons have come from all aspects of program implementation, and have led to merging some trainings, adopting new community sensitization approaches and dropping redundant ones, merging budgets to increase efficiency, and more. These adaptations have led to increased coverage.

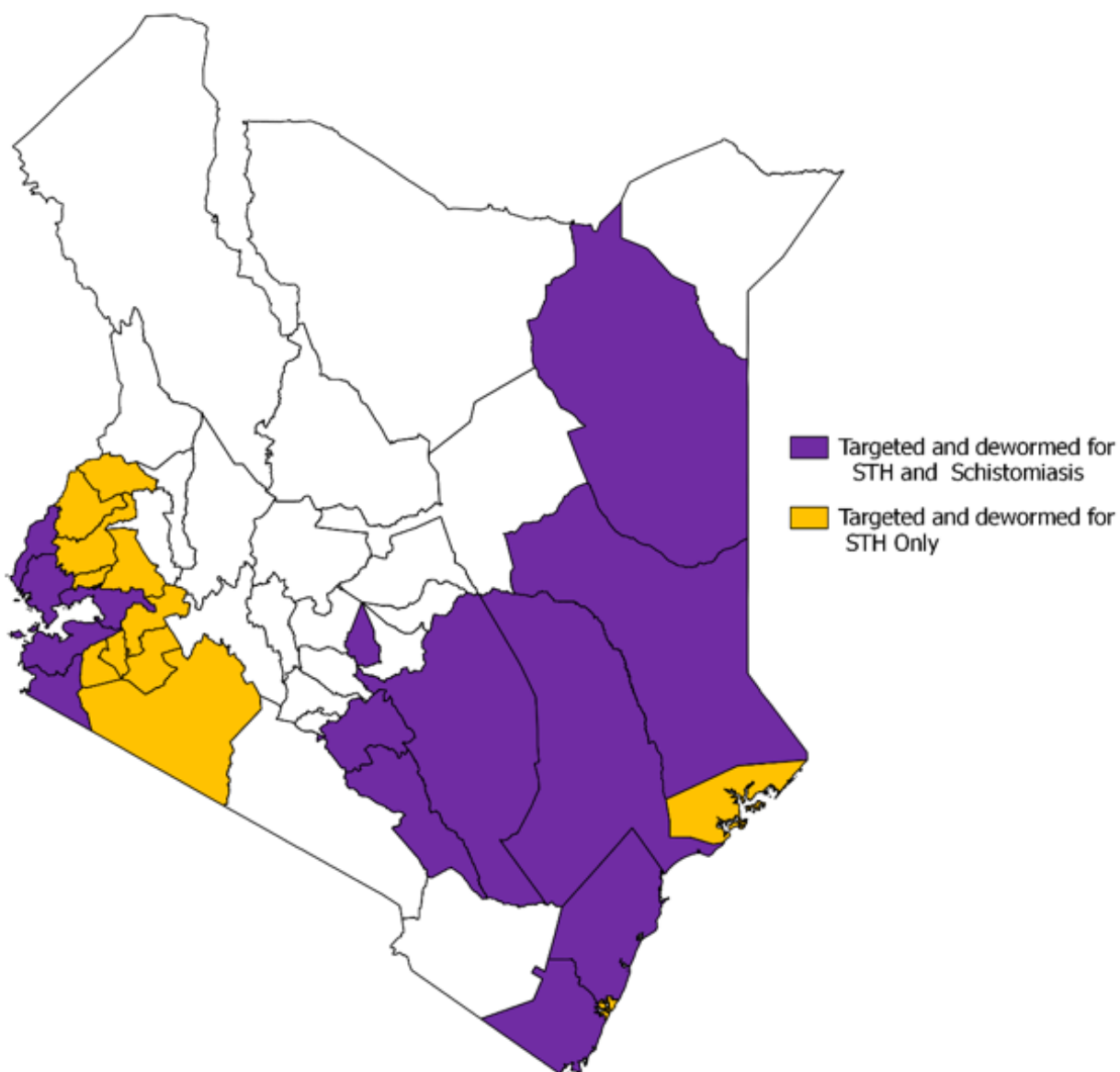
Prevalence surveys carried out by KEMRI have shown that deworming of school children alone may not be the solution to eradicating worms. Proposals from counties have been to incorporate other interventions such as community deworming and WASH programmes. The way forward may be to establish which interventions need to be combined and to bring together the various stakeholders to come up with a new ways of tapping these synergies towards the established goal.

National Treatment Coverage Map

The coverage areas of the National School-Based Deworming Programme include 27 counties across 145 sub-counties in Nyanza, Western, Rift Valley, Coast, North Eastern, Eastern, and Central regions in Kenya as depicted in the map below.

Implementation counties include:

Bomet	Kericho	Kwale	Nandi	Tana River
Bungoma	Kilifi	Lamu	Narok	Trans Nzoia
Busia	Kirinyaga	Machakos	Nyamira	Vihiga
Garissa	Kisii	Makueni	Siaya	Wajir
Homa Bay	Kisumu	Migori	Taita	
Kakamega,	Kitui	Mombasa	Taveta	



Evidence Behind School-Based Deworming

The National School-Based Deworming Programme is based on rigorous evidence that deworming has a significant impact on children's health and education.

THE PROBLEM

What are Worms?

Worms, or *minyoo* in Swahili, are parasites that live in the human intestines and bladder for survival. There are two types of worms treated by the Kenya School-Based Deworming Programme: soil-transmitted helminths (STH, or common worms) and schistosomes (which cause schistosomiasis, also known as bilharzia). Worm infection is a chronic condition that can cause anemia and malnutrition, impairing children's mental and physical development and posing a serious threat to their health, education, and productivity. Children infected with worms can become too sick or tired to concentrate at school, or even to attend school at all.

THE SOLUTION

Why Deworming?

Deworming children helps them grow, stay healthy and improve their educational attainment. The benefits of deworming are immediate, as it has a positive impact on the children who receive treatment as well as their siblings and other children who live nearby. Deworming also has long-term impact on critical factors for well-being, including education, health, and long-term productivity.

Why School-Based Deworming?

School-age children typically have the highest intensity of worm infection compared to any other age group. School-based deworming reaches children where they are – at school. Schools offer a readily available, extensive and sustained infrastructure that makes the programme cost-effective and operationally feasible.

THE IMPACT

How Does School-Based Deworming Benefit Children?

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 gain and allows more energy to be focused on child growth and development. A study in Uganda, 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 annually¹. School-based mass deworming has also shown to reduce school absenteeism more cost-effectively than alternative ways of boosting school attendance. In Kenya, school-based mass deworming reduced school absenteeism by 25% for those in treatment schools². Furthermore, deworming has spillover effects for untreated school-age and preschool children. In Kenya, young sibling of those treated, as well as children who lived nearby 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 later³.

The benefits of school-based deworming extend beyond short-term health and educational impacts. Studies have shown long-run educational and labor market benefits as a result of investment in mass deworming. Men who were dewormed as children stayed enrolled in school for a longer period of time, worked 3.4 more hours each week in the labor force, and were more likely to work in higher-wage manufacturing jobs. Women who were treated as children were more likely to pass national primary school exit exams and were 25% more likely to have attended secondary school⁴. As a result of labor market gains, investing in school-based deworming may generate more government revenue in the long-run than it costs in government subsidies⁴.

¹Alderman, 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.

²Miguel, E. & Kremer, M. (2004). Worms: Identifying impacts on education and health in the presence of treatment externalities. *Econometrica*, 72:159-217.

³Ozier, O. (2016). Exploiting Externalities to Estimate the Long-Term Effects of Early Childhood Deworming. World Bank- Development Research Group.

⁴Barid, S., Hicks, J.H., Kremer, M., & Miguel, E. (Working Paper) Worms at Work: Long-run Impacts of Child Health Gains.

Sustaining Deworming's Impact in Kenya

The NSBDP stakeholders, namely relevant units drawn from Ministry of Health and Ministry of Education, together with KEMRI, Evidence Action and CIFF, have been having conversations about the future vision, roles and responsibilities for year six and beyond.

Specifically, these conversations are aimed at achieving alignment on governance structures and roles and responsibilities for the respective units within both Ministries with the objective of putting in place a new Partnership Agreement (MOU).

Implementing the Deworming Programme: The Cascade

The National School-Based Deworming Programme uses a cascade implementation model that efficiently and cost-effectively delivers training materials, deworming tablets, monitoring forms, funds, trainings, and other programme materials and resources from the national level to schools. The cascade brings together personnel from the two ministries through collaborative leadership responsibilities for the planning, implementation and monitoring of programme activities at all levels.

At the national level, the programme trains “Master Trainers” who are personnel from Ministries of Health and Education based in implementing counties. The programme also requisitions deworming tablets, and develops/prints implementation strategies, training materials and monitoring tools. Thereafter, the cascade is initiated as depicted below:

1

1 - County Planning and Sensitization Meeting

Before implementation takes place within each county, the County Directors of Education and Health convene a meeting, facilitated by the National Programme team, where county and sub-county-level personnel are sensitized on the programme and their managerial roles. This is a critical meeting, as the programme gains buy-in and builds partnerships by engaging with county-level structures in Kenya.

Participants of this meeting include county personnel that play critical leadership roles in implementing the programme, including County Chief Officers of Health and Education, County Directors of Health and Education, County Health Records and Information Officers, County Pharmacist, County Public Health Officers, County Quality Assurance & Standards Officers, County Directors of Teacher's Service Commission, Sub-County Directors of Education (SCDEs) and Sub-County Medical Officers of Health (SCMOHs).

County-level responsibilities include:

- **Financial management:** managing budgets for county-level activities
- **Programme management:** planning and reviewing cascade activities at the county level through the County School Health Coordinating Sub-Committee, executing county-level community sensitization and mobilization, providing planning & supportive supervision to sub-counties and monitoring Teacher Trainings and Deworming Day
- **Management of deworming tablets:** receiving deworming tablets from the national store and managing their distribution to the sub-county
- **Management of materials:** receiving training and community sensitization materials and monitoring tools from the national secretariat and managing their distribution to the sub-county
- **Serving as programme representative:** serving as county's spokespersons by responding to questions regarding the programme from partners and the media

2

2 - Sub-County Training

County-based Master Trainers are deployed to train sub-county and division level personnel on managing and implementing the programme, including training teachers on how to implement a successful Deworming Day. During the training, SCMOHs and SCDEs work together to finalize the list of schools to be dewormed and update enrollment figures.

Personnel also learn about their key responsibilities for programme implementation, including:

- **Financial management:** managing individual budgets for Sub-County Trainings, Teacher Trainings and Deworming Day
- **Management of deworming tablets:** receiving deworming tablets from the County, managing their distribution to schools during Teacher Trainings and returning any remaining tablets through the Reverse Cascade
- **Management of materials:** receiving training and community sensitization materials and monitoring tools from the County and managing their distribution to all Sub-County and Teacher Trainings and the return of the monitoring tools through the Reverse Cascade
- **Programme implementation:** coordinating Teacher Trainings, ensuring that all schools attend Teacher Trainings at designated venues and are adequately prepared for Deworming Day; overseeing community-level sensitization and mobilization activities; managing any occurring adverse events, conducting programme monitoring of Teacher Trainings and Deworming Day

3

3 - Teacher Training

Trained division-level personnel train primary school head and health teachers, with oversight from sub-county officials, on their key roles for implementing a successful Deworming Day.

The roles of teachers include sensitizing the community and preparing for treatment before Deworming Day, administering deworming tablets, filling monitoring forms during Deworming Day, and returning forms and remaining tablets through the reverse cascade after Deworming Day.

4

4 - Community Sensitization & Mobilization

Immediately after Teacher Trainings, the community sensitization and mobilization timeframe officially begins where community-level health workers, alongside teachers share key messages with community members, including children, parents, village elders, and community-based organisations prior to treatment. The aim is to encourage community members to bring their children for deworming, particularly non-enrolled children. Posters sharing messages on a) the importance of deworming, b) ways to prevent worm infections, and c) the date and location of Deworming Day are also posted in strategic places around the community by teachers and community health workers.

5

5 - Deworming Day

On a designated County Deworming Day, teachers administer deworming tablets to children in schools within programme coverage areas. Tablets are given to all children aged 2-14 years, including those enrolled in primary schools, in nearby Early Childhood Development (ECD) Centres, and those from the surrounding community who are not enrolled in school. Teachers also fill in monitoring forms to record the number of children dewormed.

Ministry of Health personnel visit schools to monitor treatment to ensure proper administration and manage any occurring serious adverse events should they arise. Personnel from both ministries are available during Deworming Day to provide necessary support to teachers. After treatment, monitoring forms are returned to the National Secretariat via the Reverse Cascade and unused tablets are re-distributed to health facilities under the coordination of SCMOHs.

6

6 - Reverse Cascade

After Deworming Day, schools send their filled in monitoring forms to their division-level Curriculum Support Officer (CSO), who then compiles division-level data and sends it to the SCDE for sub-county-level summarization.

The SCDE is responsible for sharing the data with the SCMOH and County personnel and for returning the forms, along with financial accountability documentation to the National Secretariat for data analysis and financial management.

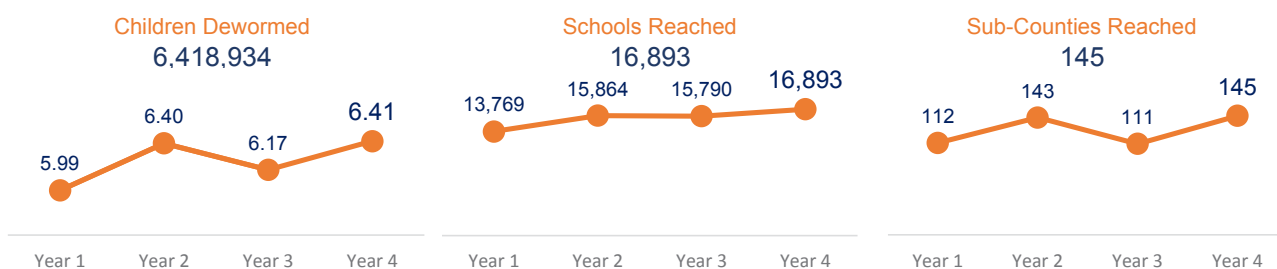
Any remaining deworming tablets at the schools are collected by the CSOs and then given to the division-level Public Health Officer who fills a tablet tracking form that calculates the number of unused tablets. These are distributed to the local health facilities for use in community deworming (after approval by the SCMOH). The tracking form is then shared with the SCDE and County personnel, and is eventually returned, along with financial accountability documentation, to the National Secretariat for data analysis, donor reporting and financial management. Ultimately, the Reverse Cascade process is critical for the calculation of the number of children treated, the quantities of tablets used and redistributed to the community, and the overall success of the programme.

After deworming, monitoring forms are returned to the National Secretariat for data analysis and unused tablets are distributed to health facilities within the County for use within the community.



Year 4 (2015-2016) National Programme Results

National Programme Coverage Summary for Soil-Transmitted Helminths (STH) Treatment

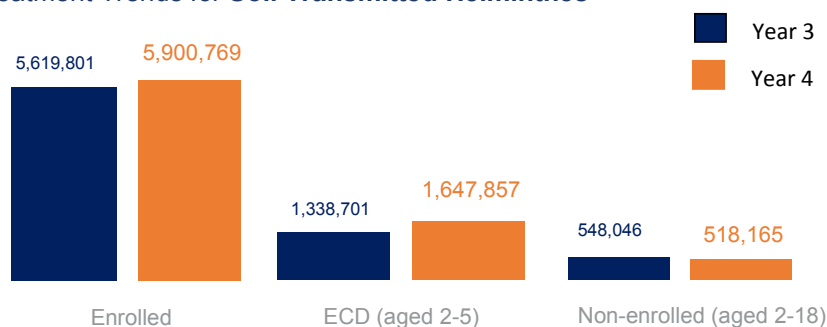


National Programme Coverage Summary for Schistosomiasis (SCH) Treatment



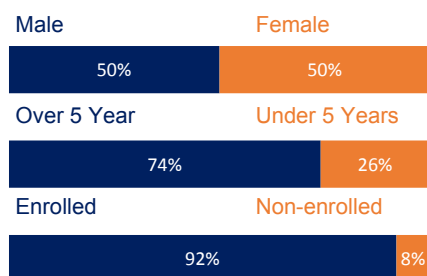
In Year, 4 the NSBDP focused on treatment coverage. This resulted in larger treatment figures for both STH and SCH.

Treatment Trends for Soil Transmitted Helminthes

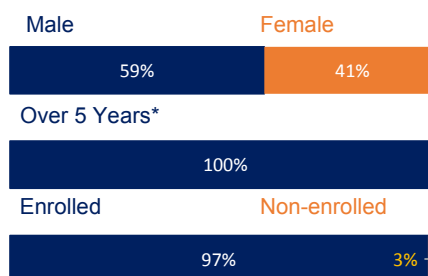


The number of children treated for STH increased by **5%** in Year 4. Treatment of ECD increased by **23%** and treatment of non-enrolled decreased by **5%**.

STH Treatment Analysis



SCH Treatment Analysis



*SCH treatment is only for children over 5

Y4 National Programme Results: County Breakdown

County	Sub County	Children dewormed (STH)	Schools reached (STH)	Children dewormed (SCH)	Schools reached (STH)
Bomet 300,454	Bomet	86,673	250		
	Chepalungu	76,374	266		
	Konoin	54,046	174		
	Sotik	83,361	281		
Bungoma 678,926	Bumula	86,261	142		
	Bungoma Central	75,847	160		
	Bungoma East	119,261	236		
	Bungoma North	96,958	176		
	Bungoma South	91,919	138		
	Bungoma West	52,745	130		
	Cheptais	55,734	129		
	Kimilili Bungoma Mt. Elgon	63,052	100		
Busia 269,708	Bunyala	27,308	56	20,859	55
	Busia	48,776	68	9,199	16
	Butula	57,708	97		
	Nambale	42,479	71		
	Samia	40,305	97	8,602	23
	Teso North	53,132	139		
	Teso South	61,950	150		
Garissa 12,421	Balambala	2,102	6	1,494	5
	Dadaab	962	3	885	3
	Fafi	3,051	8	2,383	7
	Garissa	3,815	5	3,728	5
	Hulugho	390	3	144	1
	Ijara	1,779	7	416	3
	Lagdera	322	3	220	2
Homa Bay 408,226	Homa Bay	84,371	270	20,127	80
	Mbita	45,842	224	18,578	88
	Ndhiwa	79,390	287	6,093	25
	Rachuonyo North	60,135	237	24,670	134
	Rachuonyo South	94,223	282	3,462	11
	Suba	44,265	190	10,546	48
Kakamega 688,322	Butere	59,640	124		
	Kakamega Central (Lurambi)	54,683	114		
	Kakamega East (Shinyalu)	64,864	138		
	Kakamega North (Malava)	88,187	236		
	Kakamega South (Ikolomani)	40,637	88		
	Khwisero	40,784	86		
	Likuyani	60,017	146		
	Lugari	42,957	89		
	Matete	29,458	77		
	Matungu	61,581	83		
	Mumias	87,480	139		
	Navakholo	58,034	96		
	Belgut	79,377	236		
	Buret	66,507	210		
Kericho 296,361	Kericho	64,040	204		
	Kipkelion	40,051	116		
	Londiani	46,386	132		
	Ganze	59,779	131	8,514	21
Kilifi 395,238	Kaloleni	61,816	107	17,846	31
	Kilifi	102,768	201	5,959	11
	Magarini	55,446	137	7,821	15
	Malindi	80,883	162	2,073	8
	Rabai	34,546	59	6,590	11
	Mwea East	24,965	70	20,354	68
Kirinyaga 48,644	Mwea West	23,679	59	19,897	57
	Gucha	32,077	86		
	Gucha South	70,470	224		
	Kenyan	54,389	152		
	Kisii Central	115,588	353		
	Kisii South	50,091	186		
	Marani	42,348	166		
	Masaba South	43,681	127		
	Nyamache	51,333	163		
	Sameta	23,842	72		
	Kisumu Central	47,728	71	10,784	12
	Kisumu East	35,975	73	19,215	57
	Kisumu West	45,901	127	10,247	38
	Muhoroni	51,918	137	7,415	25
Kitui 6,480	Nyakach	54,514	204	6,839	34
	Nyando	51,636	127	15,737	40
	Seme	38,006	117	18,810	72
	Kitui Central	1,051	3	667	2
Kwale 224,345	Matinyani	5,429	18	4,407	16
	Kinango	83,317	168	31,559	75
	Kwale/Matuga	52,643	136	5,923	12
	Msambweni	88,385	237	28,233	68

County	Sub County	Children dewormed (STH)	Schools reached (STH)	Children dewormed (SCH)	Schools reached (STH)
Lamu 32,615	Lamu East	5,453	21		
	Lamu West	27,162	104		
Machakos 5,230	Kangundo	1,786	6	1,169	5
	Kathiani	208	1	176	1
	Machakos	419	2	106	1
	Matungulu	1,655	6	1,613	6
	Mwala	338	2	285	2
	Yatta	824	4	660	3
Makueni 55,832	Kibwezi	2,193	3	1,774	3
	Kilungu	8,098	20	7,033	20
	Makindu	9,986	29	7,709	27
	Makueni	424	4	320	2
	Mbooni East	11,615	40	9,607	39
	Mbooni West	13,723	41	11,621	40
	Mukaa	381	2	323	2
	Nzau	9,412	29	7,264	27
	Awendo	42,343	124		
Migori 401,460	Kuria East	37,754	112		
	Kuria West	71,697	183		
	Migori	98,811	319	4,326	18
	Nyatike	61,608	209	31,214	138
	Rongo	42,893	129		
	Uriri	46,354	122		
Mombasa 226,744	Changamwe	58,547	202		
	Kisauni	91,070	302		
	Likoni	47,447	152		
	Mvita	29,680	88		
Nandi 147,756	Nandi East	47,423	117		
	Nandi South	63,097	198		
	Tinderet	37,236	128		
Narok 119,332	Trans Mara East	49,045	107		
	Trans Mara West	70,287	215		
Nyamira 219,063	Borabu	26,042	80		
	Manga	31,560	108		
	Masaba North	39,301	122		
	Nyamira North	66,140	190		
	Nyamira South	56,020	186		
Siaya 309,818	Bondo	50,913	147	7,886	31
	Gem	58,160	139		
	Rarieda	49,690	148	31,721	117
	Siaya	69,685	145	7,284	21
	Ugenya	46,199	110		
	Ugunja	35,171	93		
	Mwatate	22,564	70		
Taita Taveta 91,374	Taita	15,491	54		
	Taveta	25,142	61	8,538	20
	Voi	28,177	87		
	Bura/Tana North	18,385	66	5,140	16
Tana River 64,895	Tana Delta	26,839	72	18,092	69
	Tana River	19,671	62	5,081	8
	Kwana	103,214	243		
Trans Nzoia 328,615	Trans Nzoia East	80,650	191		
	Trans Nzoia West	144,751	305		
	Emuhaya	65,480	137		
Vihiga 205,924	Hamisi	61,646	157		
	Sabatia	47,831	128		
	Vihiga	30,967	82		
	Buna	703	3	512	3
	Eldas	614	2	507	2
Wajir 9,704	Habaswein	292	1		
	Tarbaj	1,053	3	887	3
	Wajir East	1,074	2	898	2
	Wajir North	1,971	6	1,442	6
	Wajir South	2,239	8	1,833	8
	Wajir West	1,758	5	1,321	5

Total	27 Counties 145 Sub counties	Soil transmitted Helminths (STH)	6,418,934 children dewormed
		Schistosomiasis (SCH)	669,698 adults treated
		STH and SCH	556,638 children dewormed
			49,408 adults treated



Programme Monitoring & Evaluation

The Kenya Medical Research Institute (KEMRI) is the national body responsible for carrying out health research in Kenya and a key partner of the national school-based deworming programme. Through its renowned international experts in STH and schistosomiasis, KEMRI provides technical support in mapping, parasitology and impact monitoring and evaluation. Results from this work are useful in making fundamental decisions on treatment targeting, thus helping the programme maintain its evidence-based targeting approach as described in detail below.

Programme Targeting

Scientists from KEMRI help define the programme's targeted geographies. In 2009, they defined the initial targets when they determined that the prevalence and intensity of worm infection (both STH and SCH) in sub-counties in Western, Nyanza, Coast and parts of Rift Valley regions justified treating every child in identified areas through a mass drug administration (MDA) campaign. Subsequently, KEMRI conducted parasitological surveys in additional areas for schistosomiasis, leading to an increase in the following target areas for schistosomiasis:

- In 2012-2013, the programme added Nyanza, Coast and parts of Central regions to its schistosomiasis-treating regions.
- In 2013-2014, the programme added high-risk schistosomiasis areas in Eastern, Central and North Eastern for treatment based on school-based questionnaires assessing whether children had indicated blood in urine (BIU), and parasitology surveys.
- In 2014-2015, KEMRI conducted parasitology surveys in North Eastern region to reconfirm BIU findings, resulting in reduction of the number of targeted counties and schools.

Programme Monitoring & Impact Report

Each year, beginning in January 2012, the Ministry of Health, through KEMRI's Eastern and Southern Africa Centre of International Parasite Control (ESACIPAC) has been conducting objective school-level surveys assessing the prevalence and mean intensity for all three types of STH (hookworm, whipworm, and roundworm) and *Schistosoma mansoni* and *S. haematobium* in school-age children. These surveys, which analyze the impact of deworming over time, take place before and after deworming in a randomized selection of 60 schools drawn from 20 sub-counties distributed across 16 Counties in Western, Nyanza, Rift Valley and Coast regions.

During the fourth year of NSBDP implementation, the KEMRI team analyzed samples of stool and urine from 6,295 children in 60 schools before deworming and 5,015 children after deworming in 48 schools to determine their worm prevalence rates. Table 1, summarizes the overall prevalence and mean intensity of STH and schistosomiasis from Year 1 baseline to Year 4 post-MDA.



Table 1: Overall prevalence (%) and average intensity; eggs per gram (epg) of STH and schistosomiasis: Y1 baseline – Y4 post-MDA (based on 60 schools)

Infection	Y1 baseline	Y1 post-MDA	Y2 pre-MDA	Y2 post-MDA	Y3 pre-MDA	Y3 post-MDA	Y4 pre-MDA	Y4 post-MDA
Overall Prevalence								
STH combined	33.4%	8.7 %	19.0%	6.0%	16.2%	6.3%	15.9	5.8
Hookworm	16.9%	3.2%	4.5%	2.2%	2.4%	1.8%	2.5	1.0
<i>A. lumbricoides</i>	19.2%	2.3%	12.5%	1.9%	12.7%	2.8%	11.9	1.8
<i>T. trichiura</i>	5.4%	4.3%	5.1%	2.7%	3.0%	2.3%	3.8	3.7
<i>S. mansoni</i>	1.8%	2.4%	2.7%	0.6%	1.7%	0.8%	1.7	1.2
<i>S. haematobium</i>	18.0%	8.3%	10.5%	7.6%	15.0%	5.8%	3.0	5.3
Average Intensity epg								
STH combined	1730	127	1110	90	922	128	1188	128
Hookworm	65	7	18	4	6	6	33	2
<i>A. lumbricoides</i>	1656	108	1078	82	909	117	1135	114
<i>T. trichiura</i>	10	12	14	5	8	6	20	12
<i>S. mansoni</i>	6	27	15	2	8	1	6	4
<i>S. haematobium</i>	14	7	5	4	9	1	3	2

*Y4 post-MDA was based on 48 schools, 12 schools were not surveyed due to miscommunication in the treatment dates

Worm Burden Before and After Year 4 Treatment

Year 4 treatments resulted in significant reductions in prevalence for all STH as depicted in table 2. Immediate reductions in prevalence for both schistosomes were not significant partly because treatment for these parasites was not delivered in Y3 and some parts of the survey regions in Y1.

Trends in infection prevalence and prevalence of moderate to heavy intensity for all STH and schistosomiasis infections since Y1 baseline to Y4 post-MDA are summarized in Fig 1 and 2.

Fig 1: Prevalence of STH infections and prevalence of moderate to heavy intensity infections from Y1 baseline to Y3 pre-MDA based on 60 schools

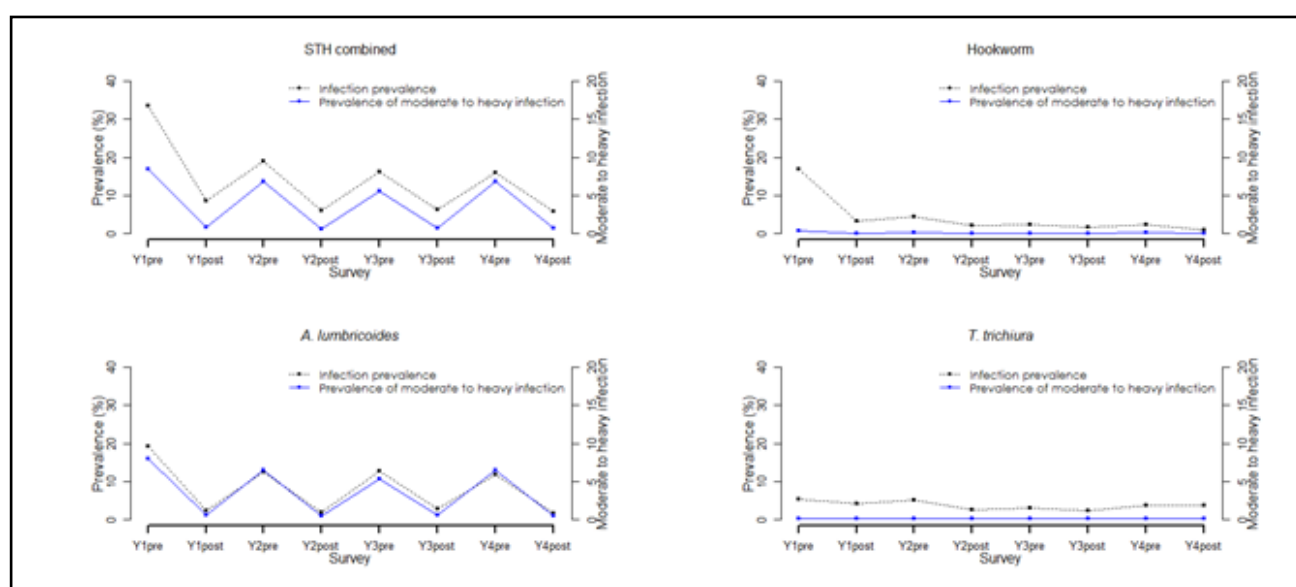
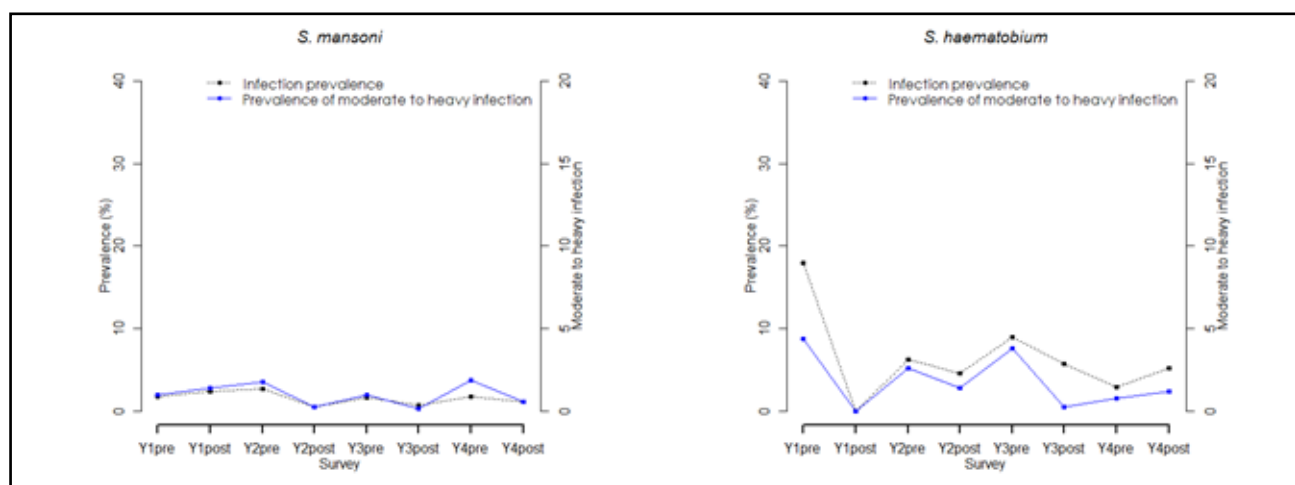


Fig 2: Prevalence of Schistosomiasis infections and prevalence of moderate to heavy intensity infections from Y1 baseline to Y3 pre-MDA based on 60 schools



The findings of the M&E programme after four rounds of MDA indicate that STH infections have continued to steadily decline from baseline infection level of 33.4% to 5.8% at Y4 post-MDA with overall significant relative reduction of 82.2% for any STH. Despite the staggered treatment for schistosome infections, there has been a non-significant decline in prevalence for *S. mansoni* infection from 1.8% in baseline to 1.2% in year 4 post-MDA and a significant decline in prevalence for *S. haematobium* infection from 18.0% in baseline to 5.3% in year 4 post-MDA. The overall reduction in STH prevalence depicts drug efficacy of albendazole for STH, however, lack of treatment delivery for schistosomiasis in some parts of survey regions during year 1 and year 3 has greatly affected reductions in prevalence for both schistosome parasites.

As shown in table 2, prevalence of STH combined has reduced overall by 52.1% and prevalence of *S. haematobium* reduced by 83.4% while *S. mansoni* prevalence insignificantly reduced by 2.7% partly because in year 1 treatment for schistosomiasis was not delivered in Western, Nyanza and Rift Valley regions, while in year 3 treatment was not delivered in all the survey areas.

Table 2: Relative reductions in prevalence (PR) and intensity of infection (IR)

Infections	Y4 post-MDA compared to Y4 pre-MDA (based on 48 schools)	Y4 pre-MDA compared to Y1 baseline (based on 60 schools)
STH combined:		
PR	62.8%	52.1%
IR	91.2%	32.6%
Hookworm:		
PR	58.6%	84.5%
IR	93.9%	45.6%
A. lumbricoides:		
PR	84.4%	39.2%
IR	91.8%	32.9%
T. trichiura:		
PR	1.0%	30.3%
IR	48.2%	Increase*
S. mansoni:		
PR	33.0%	2.7%
IR	40.1%	Increase*
S. haematobium:		
PR	Increase*	83.4%
IR	25.0%	78.5%

Conclusion

The prevalence and intensity of STH combined and species-specific infections decreased significantly between baseline and the Y4 pre-MDA survey conducted in 60 schools after three rounds of MDA delivery. Similarly, the analysis of Y4 pre-and post MDA delivery showed that there were significant immediate reductions in prevalence. As much as there are significant reductions in worm infection, however, drug therapy alone is only a short-term measure of reducing worm infection and reinfection. Long-term control measures lie in concomitantly improving the quality of the water supply, sanitation and hygiene (WASH) and hygiene education in schools.

Programme Partners

The Kenya National School-Based Deworming Programme is implemented with the support and technical assistance of several partner organisations.

Evidence Action scales proven development solutions to benefit millions of people around the world. We fill the gap between knowing “what works” and having impact at scale. We implement cost-effective interventions whose efficacy is backed by substantial rigorous evidence. We identify innovative, appropriate financing mechanisms and build best practice operational models. We voraciously self-evaluate, learn, and improve our models for scaling with a commitment to transparency on progress, impact, and value for money. Evidence Action helps translate evidence into widespread practice by advocating for school-based deworming to policy makers and providing technical assistance to launch, strengthen and sustain school-based deworming programmes. We work directly with governments to rapidly scale programmes targeting all at-risk school-age children. We work with state and national governments to institutionalize programmes and to set the course for the eventual elimination of parasitic worms as a public health problem. Evidence Action’s Deworm the World Initiative currently supports governments in Kenya, India, Ethiopia, Nigeria, and Vietnam. Learn more about our work at www.evidenceaction.org.



The Children’s Investment Fund Foundation (CIFF) is an independent philanthropic organisation headquartered in London. CIFF works to transform the lives of poor and vulnerable children in developing countries. CIFF has a child-focused portfolio of investments, targeting challenges that need urgent attention. That’s why it invests in improving children’s health and nutrition, ensuring quality education, and supporting actions to reduce climate change. CIFF places significant emphasis on quality data and evidence. Before making an investment and during implementation, it works with partners to measure and evaluate progress. CIFF aims to achieve large-scale and sustainable impact. Every child deserves to survive and thrive. For more information, please visit www.CIFF.org and follow us on Twitter @CIFFchild.



The END Fund was founded with a clear mission to control and eliminate the most prevalent neglected tropical diseases (NTDs) among the world’s poorest and most vulnerable people. END Fund does this by:

- 1) mobilizing and directing resources to where they can have maximum impact,
- 2) advocating for innovative, integrated, and cost-effective NTD programmes; and 3) facilitating private sector engagement in the movement to address the devastating effects of NTDs.

In line with this strategy, one of the END Fund’s core competencies and activities is the ongoing mapping and assessment of the NTD landscape of partners, projects, national plans, programme implementing organisations, and Ministry of Health capacity across disease-endemic countries. END Fund proactively assesses where resource investment can most efficiently and effectively move forward the NTD control and elimination agenda. END Fund then makes strategic investment recommendations to donors engaging in the cause. Where no existing qualified programme implementing partner exists, the END Fund at times implements NTD programmes in partnership with Ministries of Health. For more information, visit www.end.org.

