



**MINISTRY OF HEALTH  
VECTOR BORNE DISEASE CONTROL UNIT**

**REPORT FOR THE MEDICAL RECONNAISSANCE VISIT TO NAROK COUNTY  
FOLLOWING AN INCREASE IN SPARGANOSIS CASES**



**Index case of sparganosis in Narok County – 19<sup>th</sup> May, 2016**

**13<sup>th</sup> October, 2016**

### **Members of the National and County reconnaissance teams**

1. Dr. Kariuki Njaanake - Consultant Parasitologist Univ. of Nairobi – **Team Lead**
2. Dr. Nasimiyu Carolyne - Zoonotic Disease Unit/FELTP
3. Mr. John Kioko - Asst. Chief Med. Parasitologist, VBDCU
4. Ms. Edith Ramaita - Medical Parasitologist, VBDCU
5. Dr. Francis Kiio - County Director of Health, Narok County
6. Mr. Edward ole Tankoi - County Disease Surveillance Coordinator
7. Stephen Leshan - County Veterinary officer
8. Derick Sikawa - Narok West Sub-County Disease Surveillance Coordinator
9. Ezekiel Koech -Narok South Sub-County Disease Surveillance Coordinator
10. Michael Ngalaka - Driver (Ministry of Health (GoK))
11. J. Nadosoito - Driver (Narok County ministry of Health)

## INTRODUCTION

Sparganosis is a rare parasitic zoonotic infection caused by the plerocercoid larvae of dyphillobothroid tapeworms of the genus *Spirometra*. Sparganosis has been reported sporadically worldwide with a high prevalence occurring in Eastern Asia countries ((Zhao, Zhang, Li, & Zhang, 2014). The disease has been reported in 39 countries mostly in South-East Asia and occurs mainly in people who commonly eat raw snakes or frogs (Jeong, 2004). Parasitic infections are common in developing countries due to poor sanitation and inadequate hygiene. Many parasitic infections can persist for decades and result in significant morbidity and mortality. The disease is mainly reported in case reports and very few epidemiological studies have been carried out suggesting that the burden of sparganosis is seriously underestimated. It is a cosmopolitan disease with most of the cases having been reported in Asia (Hong et al. 2013; Kim et al. 1996; Kim et al. 2014; Park et al. 2014). A number of countries in Africa including Tanzania, Ethiopia and South Sudan have also reported several cases (Alves et al. 1954; Eberhard et al. 2015). In Kenya, the first case of sparganosis was reported in 1907 after which sporadic cases have been reported in the country (Schmid & Watschinger 2016). One notable characteristic of the disease in Kenya is that all the reported cases are from the Maasai and Pokot communities who are principally cattle, goat and sheep keeper in the vast Savannah grasslands where wild animals also roam freely (Schmid & Watschinger 2016). Human sparganosis cases have been reported in several African countries including Ethiopia and South Sudan (Eberhard et al., 2015). Little is known about distribution of cestodes due to lack of surveys of human infections undertaken in Kenya. Schmidt and Watschinger reported cases of sparganosis among the Maasai tribes in Kenya and performed over 20 operations on Maasai patients.

## Life cycle

Adult members of the genus *Spirometra* live in intestines of dogs and cats. Eggs shed in faeces and embryonate in the environment. Eggs hatch in water and release coracidia which are ingested by copepods. Coracidia develop into proceroid larvae in the copepod which are the first intermediate host. The second intermediate hosts including fish, reptiles and amphibians ingest infected copepods. The proceroid develops into the plerocercoid larvae in the 2<sup>nd</sup> intermediate host. The cycle is complete when a predator (dog or cat) eats an infected second intermediate host. Humans are accidental hosts who get infected by consumption of drinking water contaminated with infected copepods or consuming flesh of an undercooked second intermediate host.

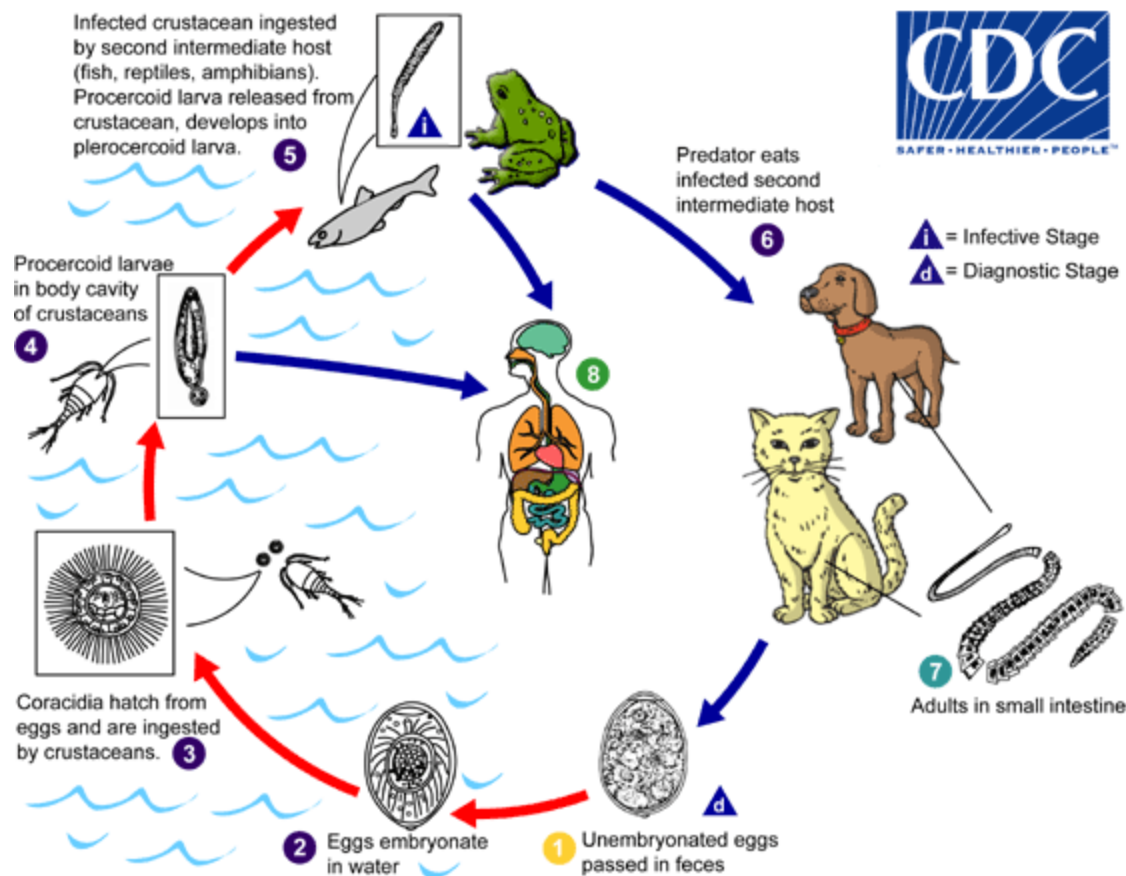


Figure 1: Life cycle of sparganosis

## Clinical presentation

Sparganum can live up to 20 years in the human host (CDC 2013). The age of onset for the disease is common in older children and adults ((Jeong, 2004). The plerocercoid larvae can migrate to almost any part of the body after invasion and the common destinations are subcutaneous tissues of the trunk, eyes, oral and maxillofacial region and viscera. Other rare sites include the scrotum (Zhao et al., 2014). In humans the disease causes local tissue damage, blindness, paralysis and even death are a major threat to human health (Anantaphruti, Nawa, &

Vanvanitchai, 2011). Definitive diagnosis is made by identification of the spargana within infected tissue obtained through biopsy.

### **Justification**

In the year 2016 three cases of subcutaneous sparganosis, all involving male patients, were reported from Narok County, part of the vast Maasailand. The spargana were surgically removed from subcutaneous nodules and sent CDC Atlanta, USA, for molecular identification where they were confirmed to be of *Spirometra* sp. Another case was reported from West Pokot County. This was a clear indication that transmission of sparganosis is actively going on in the area and prompted formation of a fact finding team comprised of Narok County Ministry of Health officials, County Ministry of Livestock officials, National Ministry of Health officials (Government of Kenya) and a scientist from the University of Nairobi, College of Health Sciences. The team made a reconnaissance visit to Narok County in May 2016 to gather information on the possible sources of sparganosis, knowledge and likely burden of the disease in the area.

### **GENERAL OBJECTIVE**

To determine the possible sources of human sparganosis, frequency of cases and the knowledge of the area residents about sparganosis.

### **SPECIFIC OBJECTIVES**

1. To describe the reported cases of the sparganosis in Narok County, 2016.
2. To determine health care workers knowledge on sparganosis
3. To assess the community's awareness on sparganosis in Narok county
4. To determine presence of any known risk factors for sparganosis in the community in Narok.

## **METHODS**

A multi-disciplinary team comprised of two parasitologists, a medical doctor and a driver travelled from the Nairobi to Narok County on 3<sup>rd</sup> October 2016 and joined a similar team from Narok County to form one team.

After a consultative meeting between the team from Nairobi and the relevant health officials from Narok County, the team visited the residential areas in Narok West and Narok South, of the patients with the previously reported sparganosis.

Local public health facilities were visited and meetings held, with the relevant health personnel including veterinary officers, when discussions on the possibility of there being other unreported cases of sparganosis in the area. A brief review of health records in the facilities was also conducted to determine whether any suspected cases of sparganosis had been reported in the facilities before.

The households where the sparganosis patients came from were visited and meetings with the local residents include community elders were held. During the meetings, focus group discussions were conducted on practices that could predispose the community to sparganosis (Schmid & Watschinger 2016). These were such as their sources of drinking water, how they treat the water before drinking, whether they eat raw or under cooked meat, whether fish is part of their diet and whether they keep domestic carnivores such as dogs and cats.

## **RESULTS**

### **Description of the area**

Narok County has a total of four sub-counties and a population of about 850,920 people according to the year 2009 census. The Maasai Mara National Park that runs across Narok West and Narok South sub-counties where the previous sparganosis cases were reported. Narok west borders Mara National park whereas Narok South borders Tanzania. The majority of people in Narok County are from the Maasai community who are livestock (cattle, sheep and goats) keepers and practice a nomadic way of life. As a result, the Maasai frequently move to Tanzania, where high sero-prevalence for sparganosis has been reported, and back to Kenya. Principally, the Maasai community members obtain their food from the livestock they keep and historically do not eat fish. A small proportion of the population in the county comes from the Luo community who practice fishing.

The team visited two health facilities (Enkitoria Dispensary and Nkoilale Community Health Centre) and one village (Embiti) in Narok West. One health facility (Moriyo Loita Health Centre) and one village (Empurpitia) in Narok South were visited. All these are areas where sparganosis had been reported in the year 2016. In addition, two areas (Kisokon and Entasikirra) in Narok South where two undocumented cases of sparganosis were said to have previously occurred were visited and contact key informants interviewed.

From the interviews with health personnel in the health facilities visited, it was apparent that cases of sparganosis are not frequently reported to the health facilities in the area and apart from the cases in 2016, no other cases had been reported during the time the present personnel was in the area. As a result, the health personnel did not have sufficient information on sparganosis



including its etiology and transmission. They reported that, prior to confirmation of diagnosis in Nairobi and CDC Atlanta; the two cases in 2016 cases were dracunculiasis. No other cases had been documented in the health facilities records in the recent past as well.

The community members visited and interviewed during FGDs, with 15 of them including local opinion leaders and women, in Narok West. During the interviews it became clear that the community members had no prior knowledge about sparganosis and reported that they had never seen another case before. The patient from Embiti village was a 20-year male who had lived all his life as a herdsman frequently traversing the grasslands with their animals. During these movements, he and his tribesmen drank water from open surface accumulations such as water pans and ponds also used by domestic and wild animals. Other sources of water for drinking and domestic chores were seasonal streams during the rainy season and water holes during the dry season. They did not treat, sieve or boil water before consumption. One water pan near the homestead where the 20-year old patient came from was visited and water samples taken . The samples were visually examined but no crustaceans such as Cyclops observed.

The community members were interviewed about their source of food as a risk factor for sparganosis. Although their main source of food was meat and milk from the cattle, sheep and goats they kept they only consumed cooked meat. They neither ate game meat nor ate fish.

Each family in the community kept at least one dog for security purposes. The owners never dewormed the dogs, which were roaming freely in home the compounds and also accompanied the herdsmen when grazing and watering their animals.

Similar observations with regard to prior knowledge about sparganosis, water sources, food and keeping of dogs were made in Narok South where a 50-year old male patient came from.

However, it was not that there were two more putative cases of sparganosis that were not reported or documented. One of the cases was of a 10-year old boy who came from a village 8 km from Morijo Loita Health Centre where he had lived his entire life. This patient reportedly had a nodule on his leg for more than a month that healed without complications after extraction of the worm in the village. The second case was of an 8-year old girl of Somali origin but had lived in Kikoson area for 5 years before moving to Entasikirra area where she lived for 1 year. She was said to have had a transient swelling on her chest from which a 15 cm long sparganum was removed. The nursing officer at Morijo Health centre corroborated this report.

### **Index Case Report**

A 20 year old male from Siana village of Narok south sub-county, Narok county noticed a small swelling in his palm that has been there for the last one year. The swelling was gradually increasing in size, mostly painless though once in a while it would be painful. The pain increased remarkably when he injured that hand while cutting wood and that's when he sought medical help.

### **Family Social History**

The patient is married to a 15 year old wife, with whom they have one child. The patient has no formal education. He works as a pastoralist, taking care of his father's cattle. He drinks water from water pans, frequently sharing the same water source as the animals (Figure 2). Drinking water at home is not treated or filtered (Figure 3). The patient had never travelled out of Narok though Tanzanians frequently bring their dogs across the border to the market. He herds his animals in the Maasai Mara national park. It is not uncommon to spot hyenas or foxes within the

human settlement areas. His family keeps both cats and dogs which have never been dewormed. The patient reports to have never eaten fish but eats raw cow kidneys frequently.



Figure 2: A hand dug water pan that serves as a source of drinking water for humans and animals



Figure 3: A hand-dug shallow hole that's serves as a source of drinking water

### Medical history

The medical history was unremarkable until the swelling in the palm started. He had visited several health centers for the swelling in the hand since May 2016 where he had been treated for a hand abscess without improvement. At ..... health centre, the findings on physical examination were of an apparently healthy young man, swollen right palm, tender, warm to touch, reddening at the site, oozing pus. There were no other significant physical findings. On expression of the wound at the health centre, a white thread worm was extruded (Figure 3).





The worm was surgically removed from the patients palm successfully. The wound has since healed well (Figure 4).



## Differential Diagnosis

1. Cutaneous anthrax
2. Abscess
3. Foreign body
4. Cellulitis
5. Myiasis

## DISCUSSION AND CONCLUSION

Sparganosis in humans is mainly associated with risky behaviors such as eating raw or undercooked meat from intermediate or paratenic hosts, drinking water contaminated with the first intermediate hosts including *Cyclops* sp., keeping dogs and cats, or living near wild carnivore which are definitive hosts of the dyphillobothroid cestodes (Schmid & Watschinger 2016). The findings of this reconnaissance visit to Narok suggest that the residents of the county do not consume raw or undercooked meat. However, the community members keep dogs, which roam freely in the homes and also accompany the herdsmen to grazing fields in addition to living in the vicinity of the Maasai Mara National Park where other wild carnivores roam freely. The area has no safe water supply and the residents consume water from different sources including potentially contaminated surface waters. It is therefore likely that eggs in faeces of the wild and domestic carnivores end up contaminating the surface waters where *Cyclops* sp. may end being infected with the procercoid of the dyphillobothroid cestodes and subsequently ingested by the area residents in water. Although no *Cyclops* sp. was found in the water samples collected from one water pan, it is noteworthy that the visit was made during the hot and dry season when the population of *Cyclops* sp. may have been low (WHO 1997).

From the recent reports of sparganosis in the area, which were corroborated by the residents and health personnel, and previous documented cases in humans and animals it is apparent that sparganosis in Narok County is more common than reported (Schmid & Watschinger 2016; Chai et al. 1997). This is more so considering that two of the known cases had not been document suggesting that there could be others that even go unreported. It is noteworthy that the only reported cases are those of subcutaneous sparganosis whereas spargana can also infect visceral organs, which is difficult to diagnose, and cause potentially fatal disease (Thus & Author 2014;

Hong et al. 2013; Nobayashi et al. 2006; Park et al. 2014). This means that the burden of sparganosis in the area may be significantly underestimated, probably partly due to diagnostic dilemma (Rahman et al. 2014).

It is also clear that the health personnel and local residents have had little knowledge about sparganosis including its transmission without which they may not be able to sufficiently institute control measures.

## **Recommendations**

Through this report the team makes the following recommendations:

- The health personnel and community members should be adequately trained on the transmission of sparganosis and how they prevent and or control the infections. Some of these measures include treating, boiling or sieving drinking water. This can benefit greatly from the control strategies employed in the control of guinea worm.
- The community members should be trained and encouraged to regularly deworm their dogs and cats to truncate potential transmission of the cestodes by the domestic carnivores that may act as the definitive hosts. Culling dogs of stray dogs in the area may also be of help to reduce environmental contamination with dogs' faeces, which could be harboring the worm eggs. This can be done with the invaluable help of veterinary officers.
- The burden of sparganosis in the area is apparently underestimated. We therefore recommend that sero-prevalence studies are carried out to ascertain the magnitude of problem. This can be of help in allocation of resources for the control of disease in the area. Thus averting a major health problem.



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