

Folder eCC_00019854 is in stage Annual_Report_Due

Name of the University, Hospital, Research Institute, Academy or Ministry

University of Napoli Federico II

Name of the Division, Department, Unit, Section or Area

Department of Veterinary Medicine and Animal Production, Laboratory of Parasitology and Parasitic Diseases - Centro Regionale Monitoraggio Parassitosi (CREMOPAR)

City Naples **Reference Number** ITA-116

Title WHO Collaborating Centre for Diagnosis of Intestinal Helminths and Protozoa

Report Year 02-2022 to 02-2023

1. Annual report on the agreed workplan

Describe progress made on the agreed workplan. For each activity, detail (1) the actions taken, (2) the outputs delivered, as well as (3) any difficulties that may have been encountered. Three responses are expected. [maximum 200 words per activity]. Indicate, if an activity has been completed previously, has not yet started or has been placed on hold.

Activity 1

Title: Development and testing of innovative diagnostic methods for intestinal parasites

Description: This collaboration will inform WHO's work towards the identification of innovative and rapid diagnostics methods for intestinal parasites, based on sensitivity, specificity and cost criteria

Status: ongoing

To achieve the WHO 2030 goals for STH control, computational and automated approaches based on machine learning (ML) and artificial intelligence (AI) are needed to facilitate and expedite accurate reading of microscopic slides and are expected to reduce the time and number of staff needed for diagnosis.

With this in mind, CC ITA -116 staff have developed advanced prototypes of the Kubic FLOTAC Microscope (KFM): a new compact digital microscope that uses ML and AI to automatically identify and count helminth eggs (Cringoli et al., Parasitology 2021).

To validate the KFM, stool samples infected with STH were used to improve KFM performance. Analyzes were performed using FLOTAC, Mini-FLOTAC, and KFM. The acquired images were first segmented into background and objects, which can be either contaminants or pseudoparasites, with the main objective of characterizing the parasite species and automatically counting the eggs.

The main result of this activity is an oral presentation at the 15th International Congress of Parasitology (ICOPA) - Copenhagen, 21-26 August 2022 (Maurelli et al., 2022).

The main difficulties encountered in these activities are based on the demanding skills (e.g., engineering) and costs associated with the development of the software for ML and AI.

In addition, the CC has been involved in evaluating the performance of various DNA-based platforms for specific and sensitive diagnosis of intestinal protozoa.

Activity 2

Title: Training on diagnosis of intestinal parasites

Description: WHO is expecting an drastic increase in surveillance activities in the next 5-10 years, and a large number of laboratory technicians, epidemiologist in endemic countries should be trained for this purpose

Status: ongoing

The CC made its training facilities (CREMOPAR) available for training under this activity, which will also provide free accommodation for 15-20 training participants for the duration of the training. It is expected that WHO will receive and process potential training requests from interested countries. In consultation with the countries concerned, WHO will identify training needs, identify groups of laboratory technicians from control programme laboratories in need of specific diagnostic training, and coordinate training activities. WHO will validate the agenda, speakers, content, and materials for these training activities.

In order to overcome the travel limitations related to the COVID pandemics in 2020 and 2021, the staff at the CC ITA-116 has continued the development and production of training materials on diagnosis of intestinal parasites (manuals, guidelines, brochures, videos, interactive training and self-learning).

The CC staff participated and provided contribution during the online meetings of the sub-groups of the WHO Technical Advisory Group for Soil-Transmitted Helminthiasis and Schistosomiasis (TAGSS) and Technical Advisory Group for NTD diagnostics.

Activity 3

Title: At request of WHO support country for the conduction of surveys in the context of control programme

Description: Control activities for intestinal parasites are in place in more than 100 endemic countries. Many of these countries request support in utilizing the diagnostic techniques presently recommended for monitoring and for the introduction of innovative technique.

The support needed is not only in terms of laboratory diagnosis but also in terms of the epidemiologic approach for study area identification, selection of villages or schools where to collect samples, definition of sample size, method to collect, transport and preserve specimens to the laboratory and interpretation of the results.

Status: ongoing

As mentioned earlier (Annual Report 2021-2022), a public WebGIS has been developed to assist countries in conducting surveys under the PC programmes (www.whocc.ita116.unina.it). The WebGIS (Maurelli et al., Geospatial Health, 2021) contains a dataset for tracking the impact of STH control in the six regions of WHO. The website also contains highly accurate dynamic maps that are constantly updated based on data from various sources (e.g., JRF, EPRF, reports from the ministries of health of each country) and by consulting the latest bibliography. The main difficulty is the availability of data, but this problem has been overcome by close collaboration with the NTD Control Department at WHO.

Last year, a fourth series of cards was developed thanks to the support of Johnson & Johnson Global Public Health. The "Drugs donated" series of maps "shows the amount of STH drugs (albendazole and mebendazole) provided to each country per year and the number of people treated.

These are the main results of Activity 3:

- A fourth series of maps is now available on the website (https://www.whocc.ita116.unina.it/drugs_donated).
- The first issue of a biannual newsletter with regular updates to the public geographic information system-based website was published by the WHO Collaborating Centre ITA116 to assist endemic countries in monitoring PC programmes (<https://www.whocc.ita116.unina.it/newsletters>).

2. Annual report on other activities requested

Should WHO have requested activities in addition to the agreed workplan, please describe related actions taken by your institution [maximum 200 words]. Please do not include in this report any activity done by your institution that was not requested by and agreed with WHO.

The CC ITA -116 has carried out the activities of parasitological surveillance (intestinal helminths and protozoa) of migrants in southern Italy in collaboration with the multifunctional health centre "Elena d'Aosta" for migrants ASL-NA1 (Naples, Italy) and the migrant centres (CAS and SIPROIMI) in the Campania region. From February 2022 to February 2023, a total of 228 migrants arriving in the Campania region (southern Italy) were screened for intestinal parasites using FLOTAC and Mini-FLOTAC techniques. A total of 36 migrants were positive for at least one intestinal parasite, representing an overall prevalence of 15.8% (Maurelli et al., Current Tropical Medicine Reports, 10: 17-25, 2023).

Migrants positive for parasitic infections received antiparasitic drugs and were retested at follow-up. To ensure the effectiveness of control measures, CC ITA -116 asked the WHO NTD control department to donate anthelmintics to treat migrants who tested positive for intestinal parasite infections. In January 2023, WHO donated albendazole 400 mg, diethylcarbamazine citrate 100 mg, niclosamide 500 mg, and praziquantel 600 mg to CC ITA -116.

The CC was designated as a hub for the distribution of these drugs to other Italian centres in need (mainly health centres providing services to migrants).

3. Resources

Indicate staff time spent on the implementation of activities agreed with WHO (i.e. those mentioned in questions no. 1 and no. 2 above). Do not include any data related to other activities done by your institution without the agreement of WHO. Please indicate staff time using the number of "full-day equivalents" – a day of work comprising 8 hours (e.g. 4 hours work per day for 7 days should be recorded as 3.5 full-day equivalents).

Number of staff involved (either partially or fully)

Senior staff	Mid-career staff	Junior staff, PhD students
2	3	2

Number of full-day equivalents, total for all staff involved

Senior staff	Mid-career staff	Junior staff, PhD students
8	25	35

Implementation of the agreed workplan activities (i.e. those mentioned in questions no. 1 and no. 2 above) normally require resources beyond staff-time, such as the use of laboratory facilities, purchasing of materials, travel, etc. Please estimate the costs of these other resources as a percentage of the total costs incurred (e.g. if you incurred costs of USD 100 and the value of your staff time was USD 50 which makes the total of USD 150, please report 33.3% and 66.7%).

Percentage of costs associated with staff time	Percentage of costs associated with other resources	Total
45.00	55.00	100.00

4. Networking

Describe any interactions or collaboration with other WHO Collaborating Centres in the context of the implementation of the agreed activities. If you are part of a network of WHO Collaborating Centres, please also mention the name of the network and describe your involvement in that network [maximum 200 words].

The CC ITA-116 has implemented collaboration with other WHO CC (i.e. TAN-8, SWI-71, BEL-42, ITA-102, ITA-107, ITA-115) in the context of the implementation of the activities on neglected parasites. In addition, the CC ITA-116 has been included as a partner in the Centre of Excellence for Neglected Tropical Diseases (CENTD) coordinated by the CC BEL-42 which has been approved under the 5th Call for International Thematic Networks. The overall aim of CENTD aims to tackle these five challenges by fostering partnerships in research, education and service. Given the diversity in NTDs, CENTD will focus on a selection of NTDs only, including echinococcosis, schistosomiasis, soil-transmitted helminthiasis (including strongyloidiasis) and taeniasis/neurocysticercosis. The Head of the CC (Laura Rinaldi) participated at the inception meeting in Gent (5-7/09/2022).

The CC is also a member of the "Italian network on NTDs" (IN-NTD), a newly established network aimed at pursuing interactions among various institutions in Italy concerned with NTDs at national and international level.

The CC ITA -116 participated in the fourth annual World NTD Day (January 30, 2023). For this occasion, a press release and a video to raise awareness about neglected tropical diseases were uploaded on the website WHO CC ITA -116 (<https://www.whocc.ita116.unina.it/world-ntd-day-2023>).