Human African trypanosomiasis (HAT), or sleeping sickness, is a parasitic disease transmitted by the bite of a tsetse fly. The disease has two forms: a chronic form caused by *Trypanosoma brucei gambiense* and an acute form caused by *Trypanosoma brucei rhodesiense*. Gambiense HAT accounts for more than 95% of all cases reported globally and can last for months to several years without symptoms, whereas symptoms of rhodesiense HAT emerge within weeks and the disease develops rapidly. Both forms can be fatal if left untreated.

Early diagnosis of HAT is a challenge because the chronic form often shows no signs or symptoms until it is more advanced. The World Health Organization (WHO) roadmap on 10 neglected tropical diseases, which was endorsed by the London Declaration of 2012, targets HAT for elimination by 2020.

HAT is endemic in the southern part of Chad, near the border with the Central African Republic (CAR). The country has been reporting the third largest number of HAT cases, just behind the Democratic Republic of the Congo (DRC) and CAR (2014 data). However, several factors make Chad a good candidate for HAT elimination through intensified control:

- The number of HAT cases has been steadily declining: the 95 cases reported in 2014 were the lowest since 1993;
- The foci (well-defined geographical areas that are HAT-endemic) where the disease has recently been reported do not extend across a national boundary; and
- Foci where cases have been reported recently are relatively small and isolated: the area of the Mandoul focus, where the majority of HAT cases are reported, is only about 600 km².

**Adapting control measures to support elimination of HAT in Chad**

Achieving elimination of HAT in Chad required more cost-effective strategies to deliver screening services as close as possible to the people at risk in all foci where the disease had recently been reported. Active screening needed to be expanded and passive screening strategies had to be adapted in order to identify the remaining cases in a more cost-effective and timely manner. Enhanced passive and active screening strategies have now been implemented, as described on p. 3.

Health facilities in the Mandoul focus have been equipped with HAT rapid diagnostic tests (RDTs) to enhance the capacity for passive screening.
Prior to 2015, case detection in Chad was primarily performed through active population screening by teams of up to 12 people travelling from village to village in a four-wheel drive vehicle. This strategy involved testing fresh blood from a finger prick using the card agglutination test for trypanosomiasis (CATT). People found to be positive were tested on the spot by parasitological methods to confirm disease. Passive screening, in which patients are tested when they visit health facilities, was restricted to facilities with access to electricity, a requirement to perform CATT. Out of 10 hospitals and health centres in the Mandoul focus, only a single health facility – the Catholic Mission Health Centre in Bodo town – was equipped with CATT and could therefore perform passive screening of patients for HAT. Over 60% of cases were being identified through active screening by the vehicle-based mobile team. Although effective, this was an expensive approach that became increasingly difficult to justify with case numbers continuing to decline. It was also impossible for one mobile team to maintain full coverage of the population in the HAT focus throughout the year.

The Mandoul HAT focus is a very fertile area. Much of the transmission takes place around a river that bisects the area, providing the habitat for the tsetse fly vectors.

The RDT can be performed by staff at the smallest health-care facilities as well as by mobile teams.

With the option for bright field microscopy, the LED FM can be used to perform all parasitological confirmation tests for HAT. It can be powered from solar panels.
In 2015, the capacity for passive screening for HAT in the Mandoul focus, in which patients are tested when they visit health facilities, was significantly expanded by:

- Equipping all ten health facilities in the focus with RDTs;
- Upgrading the laboratory at Bodo District Hospital and equipping it with facilities for confirmatory diagnosis of HAT by parasitology, including LED FM, and with LAMP, all powered by dedicated solar panels;
- Upgrading a ward at Bodo District Hospital to treat HAT patients; and
- Improving the capacity for case confirmation at the Catholic Mission Health Centre by introducing LED FM.

Patients suspected of having HAT are now being screened in any of 10 health-care facilities using RDTs. Those found positive by RDT are referred to either Bodo District Hospital or the Catholic Mission Health Centre for confirmation and treatment if found positive by parasitology.

Since 2015, the traditional large mobile teams used for active screening have been supplemented by a smaller, more cost-effective team that requires only four people who use motorcycles to cover villages that are far from health facilities. The motorcycle team implements a new active HAT screening strategy:

1. The motorcycle team travels to villages and screens the population using RDTs;
2. Patients found positive using the RDT have a blood sample dried on filter paper and transported to Bodo District Hospital for testing with LAMP;
3. If the LAMP test is positive, patients are followed up by the motorcycle team and asked to report to Bodo District Hospital for confirmatory testing using microscopy.

These efforts are supplemented by additional active screening using a vehicle-based mobile team, supported by WHO, and control of the tsetse fly vector, supported by the Liverpool School of Tropical Medicine (LSTM).

The availability of RDTs in health facilities enabled the diagnosis of 22 new HAT cases (33% of the national total), of which six were diagnosed in facilities outside Bodo town. This is a major improvement considering that in the past, most cases were detected by mobile teams. In total, 967 HAT RDTs were performed in health facilities and 4% (n=39) of them were positive.

Activities of the motorcycle teams resulted in the diagnosis of six new HAT cases. In total, 9,333 people were tested by mobile teams with HAT RDTs in 114 days of screening and 1.1% (n=98) of them were positive. Of these, 13% (n=13) were found positive by LAMP, and 46% (n=6) of the LAMP-positive cases were confirmed by parasitology.

Following the successful implementation and achievements in the Mandoul focus in 2015, HAT screening activities have now been scaled up to other endemic foci in the country.
CHALLENGES

To eliminate HAT, all cases should be identified and treated as soon as possible. The following challenges were faced during the first year of the project:

- Acceptance of the motorcycle screening teams by the community has been low, since they are different from the traditional vehicle mobile teams. This has been addressed by including a community sensitization campaign, in order to increase their willingness to present for screening.

- Ensuring that RDT-positive suspects are successfully referred for confirmation has been difficult but successful, considering that, in the past, confirmation was done on the spot by the mobile team. The community sensitization campaign should sustain these successes in 2016.

- Some villages and HAT screening facilities are far from the two health facilities where confirmation of HAT is done. The terrain and distances make it difficult for some HAT suspects to reach the confirmation centres. Similarly, the motorcycle teams have problems accessing some of the most remote communities. This is being addressed by adding one more motorcycle mobile team, and increasing the facilities for confirmatory diagnosis.

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FURTHER INFORMATION

Information regarding the diagnosis of HAT is available at: http://www.finddx.org/programs/hat-ond/hat/