

Research capacity strengthening for
NTD:sleeping sickness research
in the Democratic Republic of Congo (DRC)

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DRC : country characteristics

- large country with immense natural resource wealth
- located in Central Africa
- 60 millions inhabitants
- 1 234 000 Km² (similar to European Union or 80 times Belgium)
- 11 administrative provinces including Kinshasa town-province, the capital
- 167th out of 177 on the UNDP Human Development Index scale
- Parliamentary regime with constitution based on administrative decentralization, but decentralization process not yet finished

DEMOCRATIC REPUBLIC OF CONGO

- The regional picture

Clickable map

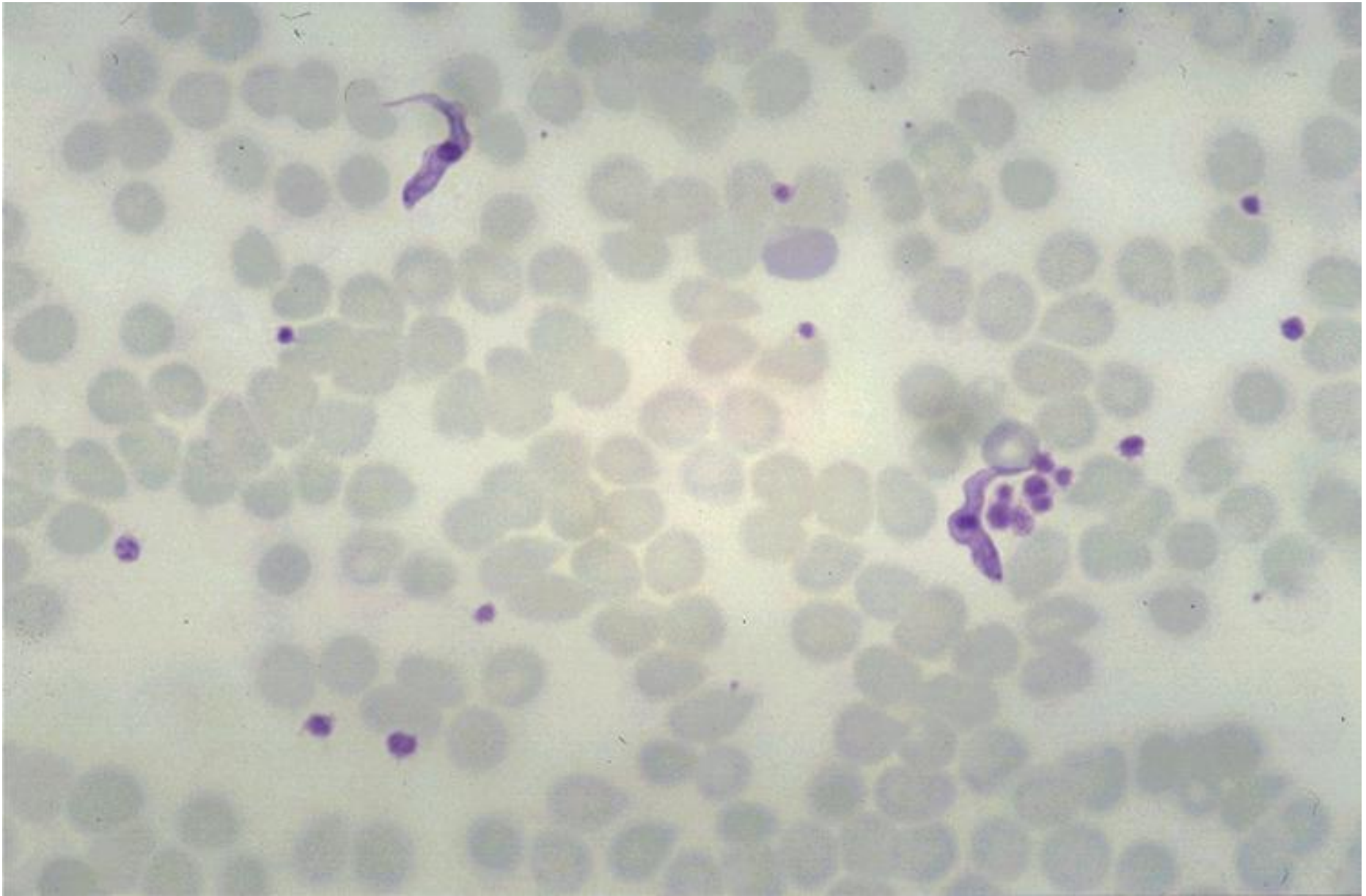


- Life expectancy at birth M/F (2006): **46/49**
- Infant mortality (2006): **129 ‰**
- Human Poverty Index rank out of 108 countries (2007) **88**
- Total per capita health expenditure (2005): **5US\$**
- Nurses rate /10000 (2000-06): **5**
- Physicians rate /10000 (2000-06): **1**

Sleeping sickness in DRC

Introduction

- Human African Trypanosomiasis (HAT), also known as 'sleeping sickness' is a vector-borne parasitic disease
- East African HAT
 - an acute syndrome
 - caused by *T.b. rhodesiense*
 - maintained by an animal reservoir
- West African HAT
 - more protracted course
 - caused by *T.b. gambiense*
 - transmitted in a man-fly-man cycle; (the role of an animal reservoir still debated)
 - responsible for 90 % of HAT cases world-wide

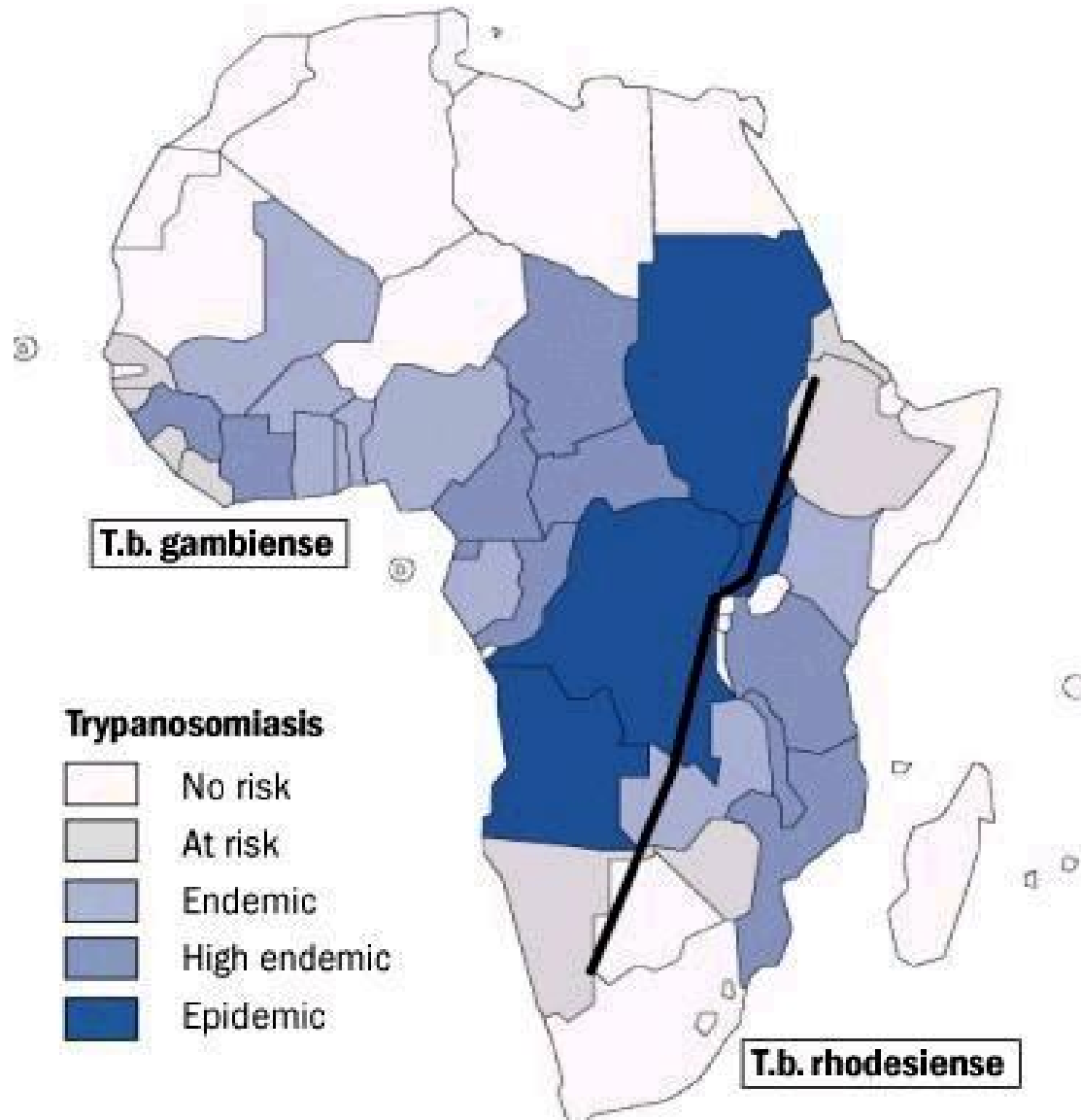


Transmission

- Thirty-one different species of tse-tse fly (*Glossina* sp.) transmit HAT
 - *morsitans* group involved in the transmission of *T.b. rhodesiense*
 - *fuscipes* and *palpalis* group are mainly involved in the transmission of *T.b. gambiense*



Geographical distribution East and West Human African Trypanosomiasis



Importance of the HAT *T.b.gambiense* problem

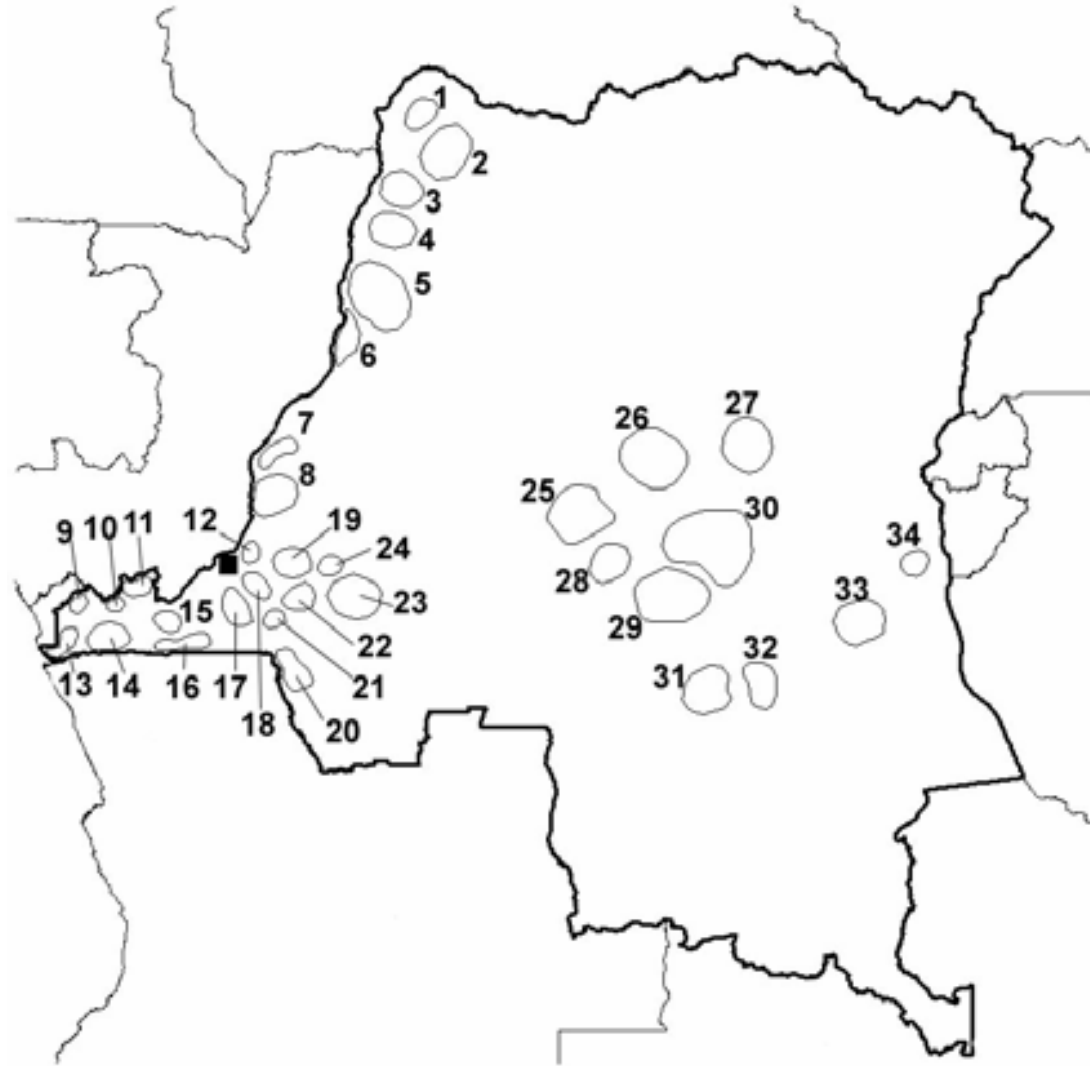
(WHO, *Wkly.Epidemiol.Rec.*,2006)

- 17 036 new cases reported worldwide in 2004
- Most recent estimate by WHO of true caseload:
50 000 to 70 000 cases
- 61 % of reported cases in 2004 occurred in DRC

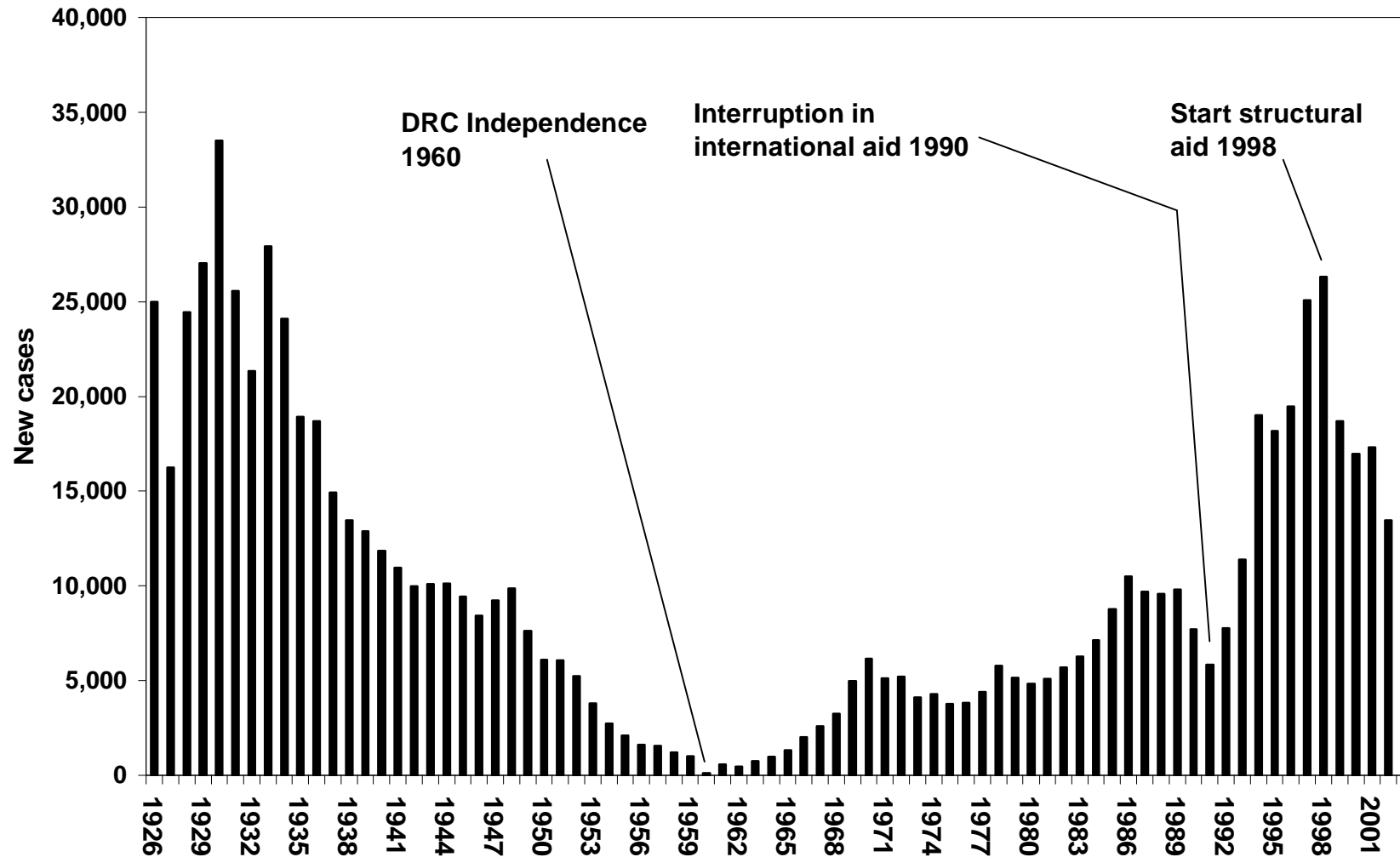
**Top ten causes of death, all ages
Democratic Republic of the Congo, 2002 (WHO)**

Cause	Deaths (000)	%	YLL lost (%)
All causes	978	100	100
Diarrheal diseases	112	11	13
HIV/AIDS	111	11	11
Lower resp.inf.	108	11	13
Malaria	97	10	12
War	44	4	4
Perinatal	39	4	5
Measles	37	4	5
Tuberculosis	33	3	3
Cerebrovascular	26	3	1
Ischemic heart dis	24	2	1
.....			
Sleeping sickness	2.9	0.3	0.3

HAT foci in DRC



History of HAT in DRC (1926-2003)



National HAT control program

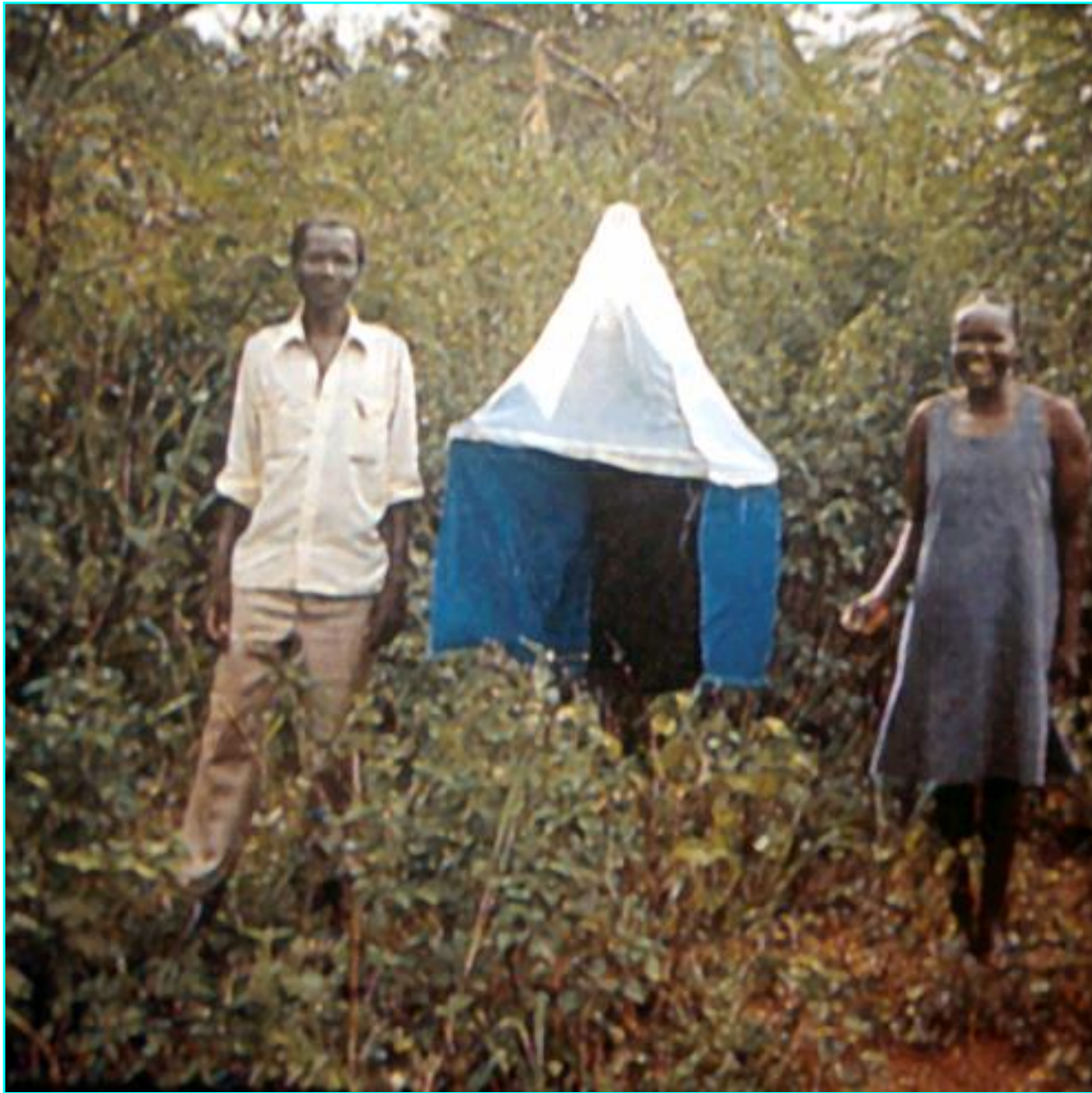
Two main objectives:

- To reduce mortality and morbidity by detecting and treating cases at an early stage.
- To decrease and in some cases ‘eliminate,’ the pool of infected people, to reduce transmission.

National HAT control program strategies

- Active case finding followed by treatment
 - Using CATT as screening test
 - Using sensitive parasitology exams such as:
 - Capillary tube centrifugation
 - Mini Anion-exchange Centrifugation Technique
- Vector control
 - Not systematic as added value is debated

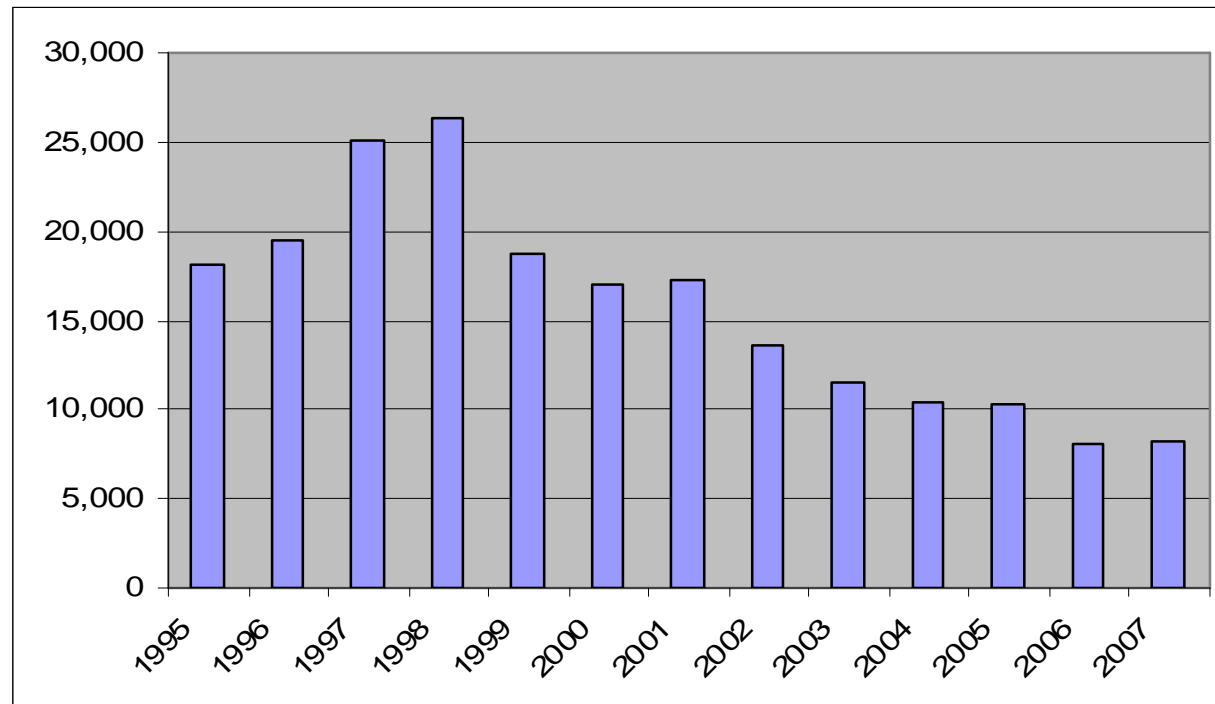




National Control Programme funding

- Very dependent on donors
- Mainly (more than 90%) funded by the Belgian cooperation (1998-2005) Lutumba et al. 2006
- Past five years: 12 million Euros

Recent number of HAT cases reported per year, DRC (1995-2007)



12 millions at risk

15-20 % coverage

Research in DRC

% DRC budget dedicated to research < 1% ,
and this amount has not been disbursed since
at least ten years

Human resources

- DRC now has (approximately) 30 faculties of medicine and research institutions. Most of these schools of medicine depend on the Kinshasa University for their staff: either at Professor or lecturer level and usually they have a UNIKIN professor as dean or chancellor
- Some faculties (polytechnics) are closed because of the lack of professors
- Number of Professors in DRC: 1500 (Source/Ministry of Education)
- Average age of professors: 60 years (± 5)
- Not a single post-doc younger than 45 years at UNIKIN/School of medicine
- Research capacity for e.g. at INRB one of the important research centers for tropical diseases:
 - Up to 2005 one staff with PhD degree; now 2

Publication analysis

- Main publications by DRC authors: > twenty years ago.
- Recently, DRC was classified among the last ten country position according to publications
- Authors tend to publish in non-demanding journals
- Quality of national journal needs to be improved by better peer review and more stringent editorial policies

- There is a true need to improve the research capacity in DRC
 - how ?
 - who can improve RC?
 - who can fund this?

How to improve RC?

- Participation in studies from outside of DRC
- Training at high level
 - Local training at the level of PhD could take 20 years
 - Training outside :who could pay for that?
 - How select the good candidate in the DRC context
- Advocacy:
 - politic and decision makers?
 - Donors and other agencies?

Research capacity strengthening in DRC

- We examined all the studies conducted in the field of HAT between 2000 to 2006 in DRC and analyzed to what extent research capacity building was achieved
- We collected data on:
 - Duration of the study
 - Budget
 - Type of study
 - Sponsors
 - Implementing agency
 - Number and qualification of Congolese scientists in the study
 - Career track of Congolese participants
 - Ownership of equipment and material
 - Per diems paid to local investigators and the local team
 - Implication of Congolese Universities
 - Implication of Congolese research institutions

- The PNLTHA contributed to 14 'ad hoc' international collaborative studies between 2000 to 2006:
 - *IMPAMEL*
 - *DB 289 (phase 2A, 2B)*
 - *Pentamidine 7 versus 3*
 - *NECT*

 - *Melarsoprol and pregnancy*
 - *Cardiac complications in HAT*
 - *Blood safety and HAT*

 - *Genetic susceptibility*
 - *HLA*
 - *Neurotryp*

 - *Trypanosome resistant strains*
 - *HAT sentinel surveillance project*
 - *Follow up of CATT-positive, parasitologically negative individuals*
 - *Urban transmission of HAT*

1 RC program at INRB included (2000-2006) 6 HAT research projects

- Burden of disease due to *T.b.gambiense*
- HAT perception
- Validity of diagnostic tests
- Cost-effectiveness of HAT algorithms
- Melarsoprol resistance
- THARSAT

RC as a result of 14 ad hoc studies

- **Equipment** : Microscope, freezer, ECG, etc.. remains the property of the PNLTHA after the study. Treatment centres received beds, bed nets and other equipment including some rehabilitation.
- **Participation of congolese universities**: Not a single university, and only 1 research institution (INRB)
- **Training**:
 - Ad hoc training usually organized before start of the study protocol
 - Master level: **0**
 - PhD level : **0** contrasting **to at least 4 PhD degrees obtained by international collaborators through this research**
- **Salaries**
 - local PI: 200 to 600 US\$ per month
 - local team: 24 to 150 US\$ per month
- **Publication analysis**
 - Congolese investigator as a first author: 0

RC as a result of 6 HAT research projects included in RC program (2000-2006)

- **Equipment** : Microscope, freezer, ECG, etc.. remains the property of the PNLTHA/MOH after the study. Treatment centres received beds, bed nets and other equipment including some rehabilitation.
- **Participation of congolese universities**: UNIKIN and INRB
- **Training**:
 - Ad hoc training usually organized before start of the study protocol
 - Master level: **4**
 - PhD level : **1** contrasting **to 0 PhD degree obtained by international collaborators**
- **Salaries**
 - Local staff :500 US\$ per month
 - ph-D grantee: 1500 US\$ per month
 - post-doc: 2000 US\$ per month
- **Publication analysis**
 - Congolese investigator as a first author: 5

- In conclusion, 14 ad hoc studies led to RC strengthening in the North (4 PhD) , but not in South.
- The 14 ad hoc studies had clinical /public health benefit for HAT patients, but DRC participation did not lead to long-term RC building, for a disease which is specific for the South
- Need of other strategy for RC building

RC program at INRB

- This project addresses tropical diseases research priorities
- Funding by Belgian cooperation via ITM Antwerp
- The main goal is:
 - Technology transfer
 - Training at higher education- level: master and PhD

- Before project:
 - INRB was characterized by lack of:
 - Researchers: one PhD
 - Equipment
 - Reagents
 - Etc.
- 10 years after:
 - Researchers
 - 2 PhDs
 - 2 PhDs finalized
 - 4 PhD projects ongoing
 - 4 masters
 - Technology transfer including ELISA, PCR conventional and in real time

Institut National de Recherche Biomédicale (INRB)



Difficulties

- Selection process of the right candidates
- Custom fees
- local conflicts
- Conflict between young and old researchers
- Donor dependance: sustainability?
- Trained researchers prefer to move to developed countries
- Priority always given to external researchers because they came with money
- Lack of research priorities and policy at the level of government

Conclusion

- The best way to improve is to focus really on RC.
- Government should invest in this domain. More advocacy needed
- Participating to ad hoc research projects is not the best way.
- Developing countries need a critical mass to be a partner of the developed countries in research on infectious diseases mainly neglected diseases