Table of NTDs

Twenty-one diseases or groups of diseases are listed by the World Health Organisation (WHO) as Neglected Tropical Diseases (NTDs). None of these are generally considered rodent-borne zoonotic diseases. Despite this, there is some evidence for an important role of rodents in transmission of these diseases that warrants further investigation. For each of the NTDs the known or potential role of rodents in transmission is described. For example, Chagas disease, caused by the parasite *Trypanosoma cruzi*, vectored by triatomine bugs, may be affected by rodent populations in endemic areas where rodents are competent hosts of the parasite and provide blood meals to the vector1,2. However, rodents may be more peripherally involved in transmission of zoonotic NTDs, Echinococcosis is caused by transmission of eggs from definitive hosts (i.e., dogs) to an an aberrant intermediate host (i.e., humans). Rodents may act as intermediate hosts and direct predation by canids or feeding on offal from human hunted rodents may increase the prevalence of this pathogen in endemic regions, indirectly contributing to the human health burden of this NTD3.

| NTD | Rodent associations | Reference |
| --- | --- | --- |
| Buruli Ulcer (*Mycobacterium ulcerans*) | Transmission route unknown. Potential involvement of small rodents. | 4,5 |
| Chagas disease (*Trypanosoma cruzii*) | Rodents are known hosts of *T. cruzi* and provide bloodmeals to Triatoma insects, the vectors of Chagas disease. | 1,6 |
| Dengue and Chikungunya | Dengue viraemia has been reported in synanthropic rodents, contribution to transmission is unknown. Potential involvement of rodents in sylvatic maintenance of Chikungunya but limited evidence. | 7,8 |
| Dracunculiasis | Rodents can be experimentally infected, potential paratenic hosts. | 9 |
| Echinococcosis (*Echinococcus granulosus* and *Echinococcus multilocularis*) | Primary transmission is assumed to be through contact with pet dogs or other canids. Rodents are important intermediate hosts of *Echinococcus spp.* contributing to prevalence in zoonotic hosts. | 3,10 |
| Foodborne trematodiasis | Rodents are potential hosts of *Paragonimus spp.*, *Opisthorchis spp.* and *Clonorchis spp.*, their role in transmission is unknown. | 11–13 |
| Human African trypanosomiasis (*Typanosoma brucei gambiense* and *T. b. rhoesiense*) | Rodents have been found to be infected with parasites, their role in transmission is unknown. | 14 |
| Leishmaniasis (*Leishmania spp.*) | Rodents have been found have infected in endemic areas, onward infectiousness to Phlebotomus vectors is mixed. | 15,16 |
| Leprosy (*Mycobacterium leprae*) | Red squirrels in the UK have been found to be infected, limited testing in other rodent species. | 17,18 |
| Lymphatic filariasis (*Wuchereria bancrofti*, *Brugia malayi* and *B. timori*) | No known non-human hosts of *W. bancrofti*. *B. malayi* can be transmitted by rodents, their role in maintenance is unknown. | 19,20 |
| Mycetoma | Not known to be zoonotic. Potential involvement of ticks in transmission in Sudan. | 21,22 |
| Chromoblastomycosis | Not known to be zoonotic. Animal associated outbreaks have been reported in Brazil. | 23 |
| Noma | Not considered an infectious disease, caused by commensal bacteria. |  |
| Onchocerciasis (*Onchocerca volvulus*) | Not known to be zoonotic. | 24 |
| Rabies | Rodents not considered to be important vectors. Outbreaks in rodent populations are assumed animal-to-animal spillover during epizootic periods. | 25 |
| Scabies (*Sarcoptes scabiei* ) and other ectoparasites | No zoonotic transmission of scabies. Ectoparasites are common in synanthropic rodents. | 26 |
| Schistosomiasis (*Schistosoma mansoni*) | Rodents are potentially important reservoir hosts and sites of hybridisation. | 27,28 |
| Soil-transmitted helminthiasis | Rodents may contribute to Ascaris transmission as intermediate hosts. Rodents are reservoirs of Toxocara species. | 29,30 |
| Snakebite envenoming | Rodent abundance may support higher snake populations but do not directly contribute to human incidents of envenoming. | 31 |
| Taeniasis/cysticercosis (*Taenia solium*) | Rodents not involved in transmission. | 32 |
| Trachoma (*Chlamydia trachomatis*) | Not known to be zoonotic. | 33 |
| Yaws (*Treponema pallidum*) | Rodents not involved in transmission | 34 |

# References

1. Hernández-Cortazar, I. *et al.* Frequency of trypanosoma cruzi infection in synanthropic and wild rodents captured in a rural community in southeast of mexico. *Veterinary medicine international* **2018**, (2018).

2. Nunes, M. C. P. *et al.* Chagas disease: An overview of clinical and epidemiological aspects. *Journal of the American College of Cardiology* **62**, 767–776 (2013).

3. Stieger, C., Hegglin, D., Schwarzenbach, G., Mathis, A. & Deplazes, P. Spatial and temporal aspects of urban transmission of echinococcus multilocularis. *Parasitology* **124**, 631–640 (2002).

4. Dassi, C. *et al.* Detection of mycobacterium ulcerans in mastomys natalensis and potential transmission in buruli ulcer endemic areas in côte d’ivoire. *Mycobact Dis* **5**, 2161–1068 (2015).

5. Hammoudi, N. *et al.* Disseminated mycobacterium ulcerans infection in wild grasscutters (thryonomys swinderianus), côte d’ivoire. *The American journal of tropical medicine and hygiene* **101**, 491 (2019).

6. Velázquez-Ramı́rez, D. D., Pérez de Léon, A. A. & Ochoa-Dı́az-López, H. Review of american trypanosomiasis in southern mexico highlights opportunity for surveillance research to advance control through the one health approach. *Frontiers in Public Health* **10**, 838949 (2022).

7. Gwee, S. X. W., St John, A. L., Gray, G. C. & Pang, J. Animals as potential reservoirs for dengue transmission: A systematic review. *One Health* **12**, 100216 (2021).

8. Ng, L. C. & Hapuarachchi, H. C. Tracing the path of chikungunya virus—evolution and adaptation. *Infection, Genetics and Evolution* **10**, 876–885 (2010).

9. Cairncross, S., Muller, R. & Zagaria, N. Dracunculiasis (guinea worm disease) and the eradication initiative. *Clinical Microbiology Reviews* **15**, 223–246 (2002).

10. Rausch, R. & Schiller, E. L. Hydatid disease (echinococcosis) in alaska and the importance of rodent intermediate hosts. *Science* **113**, 57–58 (1951).

11. Fan, P., Lu, H. & Lin, L. Experimental transfer of paragonimus westermani from rodents to rodents following subcutaneous and intraperitoneal routes. *Journal of helminthology* **68**, 41–44 (1994).

12. Tangkawattana, S. & Tangkawattana, P. Reservoir animals and their roles in transmission of opisthorchis viverrini. *Advances in Parasitology* **101**, 69–95 (2018).

13. Qian, M.-B., Utzinger, J., Keiser, J. & Zhou, X.-N. Clonorchiasis. *The Lancet* **387**, 800–810 (2016).

14. Mehlitz, D. & Molyneux, D. The elimination of trypanosoma brucei gambiense? Challenges of reservoir hosts and transmission cycles: Expect the unexpected. *Parasite Epidemiology and Control* **6**, e00113 (2019).

15. Sadlova, J. *et al.* Host competence of african rodents arvicanthis neumanni, a. Niloticus and mastomys natalensis for leishmania major. *International Journal for Parasitology: Parasites and Wildlife* **8**, 118–126 (2019).

16. Alcover, M. M., Riera, M. C. & Fisa, R. Leishmaniosis in rodents caused by leishmania infantum: A review of studies in the mediterranean area. *Frontiers in veterinary science* **8**, 702687 (2021).

17. Meredith, A. *et al.* Leprosy in red squirrels in scotland. *The Veterinary Record* **175**, 285 (2014).

18. Ploemacher, T., Faber, W. R., Menke, H., Rutten, V. & Pieters, T. Reservoirs and transmission routes of leprosy; a systematic review. *PLoS neglected tropical diseases* **14**, e0008276 (2020).

19. Nelson, G. S. Filarial infections as zoonoses. *Journal of Helminthology* **39**, 229–250 (1965).

20. Ash, L. R. & Riley, J. M. Development of subperiodic brugia malayi in the jird, meriones unguiculatus, with notes on infections in other rodents. *The Journal of parasitology* 969–973 (1970).

21. Fahal, A. H. & Bakhiet, S. M. Mycetoma and the environment. *PLoS Neglected Tropical Diseases* **17**, e0011736 (2023).

22. Azrag, R. S. *et al.* A possible role for ticks in the transmission of madurella mycetomatis in a mycetoma-endemic village in sudan. *Transactions of The Royal Society of Tropical Medicine and Hygiene* **115**, 364–374 (2021).

23. Rodrigues, A. M., Hoog, G. S. de & Camargo, Z. P. de. Sporothrix species causing outbreaks in animals and humans driven by animal–animal transmission. *PLoS pathogens* **12**, e1005638 (2016).

24. Toé, L., Tang, J., Back, C., Katholi, C. R. & Unnasch, T. R. Vector-parasite transmission complexes for onchocerciasis in west africa. *The Lancet* **349**, 163–166 (1997).

25. Fitzpatrick, J. L., Dyer, J. L., Blanton, J. D., Kuzmin, I. V. & Rupprecht, C. E. Rabies in rodents and lagomorphs in the united states, 1995–2010. *Journal of the American Veterinary Medical Association* **245**, 333–337 (2014).

26. Ho, J., Changbunjong, T., Weluwanarak, T., Hussain, S. & Sparagano, O. The pests of a pest: A systematic review of ectoparasitic fauna among synanthropic rodents in the 21st century with meta-analysis. *Acta Tropica* **215**, 105802 (2021).

27. Duplantier, J.-M. & Sene, M. Rodents as definitive hosts of schistosoma, with special reference to s. Mansoni transmission. in *Micromammals and macroparasites: From evolutionary ecology to management* 527–543 (Springer, 2006).

28. Catalano, S. *et al.* Multihost transmission of schistosoma mansoni in senegal, 2015–2018. *Emerging infectious diseases* **26**, 1234 (2020).

29. Tiner, J. D. Fatalities in rodents caused by larval ascaris in the central nervous system. *Journal of Mammalogy* **34**, 153–167 (1953).

30. Hildebrand, J., Zalesny, G., Okulewicz, A. & Baszkiewicz, K. Preliminary studies on the zoonotic importance of rodents as a reservoir of toxocariasis from recreation grounds in wroclaw (poland). *Helminthologia* **46**, 80–84 (2009).

31. [Echis ocellatus](http://www.toxinology.com/fusebox.cfm?fuseaction=main.snakes.display&id=SN0221). (2024).

32. Flisser, A. *et al.* Taenia solium: Current understanding of laboratory animal models of taeniosis. *Parasitology* **137**, 347–357 (2010).

33. Rodolakis, A. & Mohamad, K. Y. Zoonotic potential of chlamydophila. *Veterinary microbiology* **140**, 382–391 (2010).

34. Chuma, I. S. *et al.* Widespread treponema pallidum infection in nonhuman primates, tanzania. *Emerging Infectious Diseases* **24**, 1002 (2018).