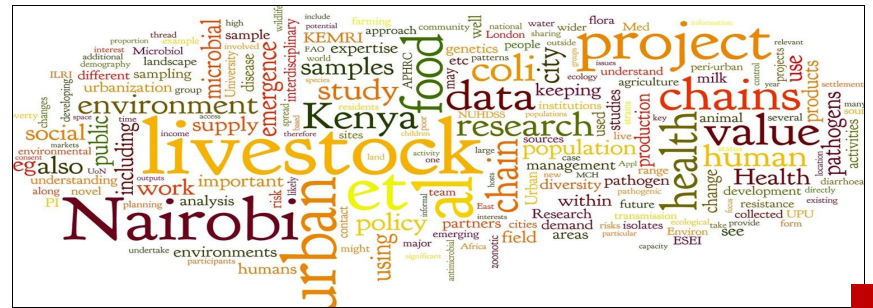


The "URBAN ZOO" Newsletter



FEBRUARY, 2016

Quarterly Newsletter on "Epidemiology, Ecology and Socio-Economics of Disease Emergence in Nairobi"

Letter from the PI

INSIDE THIS ISSUE:

Co-Pi's Letter	1
Urban Zoo Team-Annual meeting	2
Student profiles	2
99 HouseHold Study	3
FELTP	4
Recent publications	4
Current opportunities	4
Upcoming Events	4

URBAN ZOO PROJECT

Urban Zoo is an interdisciplinary programme focused around the role of urbanization in the emergence of zoonotic pathogens. We are funded by the Environmental and Social Ecology of Human Infectious Diseases initiative (ESEI), a joint UK Research Council initiative which is part of the Living With Environmental Change Programme.



[Prof. Eric Fèvre](#)

It's a real pleasure to have the opportunity to write for the Urban Zoo newsletter in this first quarter of 2016. This is a job of the co-PIs on this large project do in turn, and as I wrote for the [first newsletter](#), this must make this issue the 10th so far.

The Urban Zoo project is certainly an exciting and challenging 'beast.' Funded by the UK Research Council [Environmental and Social Ecology of Human Infectious Diseases](#) (ESEI) initiative, we've certainly been deeply engaged in building an evidence base that is allowing us to understand the human, natural, wildlife and social environment of the complex and fascinating city of Nairobi. Our teams, each led by specific expertise in different leading academic institutions in Kenya and the UK, have lifted the lid on the complex worlds of livestock production, food supply, human nutrition, diarrhoeal disease, wildlife-human-livestock interfaces, microbial genetics, low income settlement patterns and urban planning. The efforts and energy of the field teams and lab teams in delivering the samples and the data on this project are quite astounding.

The last 18 months have been pivotal for this project. We've been working extremely hard on the "[99 household study](#)," which is described in this newsletter and in other newsletters in this series, and which focuses on mapping bacterial genetic relationships in isolates

in a diversity of ecological niches at the household level. The sample frame is stratified both by type of livestock kept and by socio-economic status. Material gets selected in the field, at the point of collection, for forwarding for whole genome sequencing (WGS) with our partners in the UK. It won't be long now before we have our first WGS-derived phylogenetic tree of *E. coli* isolated from this part of the project, a major milestone.

The productivity in data gathering in the early years of the project is starting to pay off. At the last count, there are 15 manuscripts in preparation, with a long string of others awaiting data to come back from collaborators so we can get down to analysis and paper writing. We're in negotiations with journals to have special issues bringing some of our key papers together, and have our eye on some very high impact journals to report our key results. We have been, and continue to be, grateful not only to the ESEI programme for funding this far reaching work, but also to the other funders who have contributed to specific elements, including the CGIAR Research Programme on [Agriculture, Nutrition and Health](#), the [Leverhulme Centre for Integrative Research](#) on Agriculture and Health and the funders of several of our PhD students.

With now just over a year to go on this project, we are working hard to understand the mechanisms that may lead to the introduction of pathogens into urban environments, and the emergence of those pathogens in the human population.

Urban Zoo Partners:



Urban Zoo Annual Meeting

Post meeting group photo

collected in each household. Quality insurance processes such as duplicate sampling and testing between both University of Nairobi and KEMRI laboratories have been put in place.

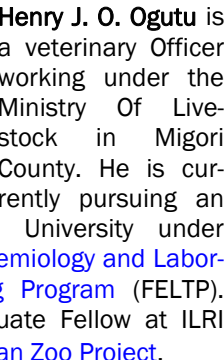
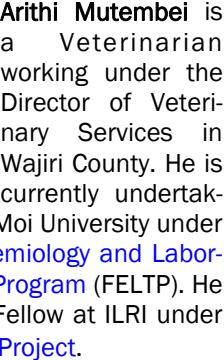
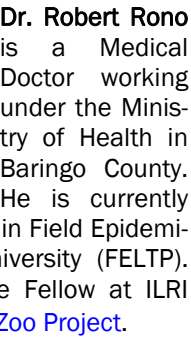
The group discussed next steps in terms of addressing the **value chain component** of the Urban Zoo project. It was agreed that sampling of the beef and pork value chains will start in a near future, the poultry value chain sampling being already covered by one of the PhD projects.



Meeting participants taking a break

Nairobi. Ongoing discussions about the scope and feasibility of this study are still ongoing. The PIs reported multiple initiatives in terms of public health trainings and promotions materials and the study team received very positive comments from the external panel. The next and final Urban Zoo meeting is planned to take place in Kenya next year.

Selected student profiles: 3 FELTP cohort 12



URBAN ZOO PROJECT: The interesting mix of the 99 household study - an interesting and exciting diversity!



Studying zoonoses of livestock and wildlife in an urban setting presents us with a very interesting study site. We collect samples from the slums (the very low income area), middle income areas and the very high income areas of Nairobi, with varied levels of environmental contamination, ranging from areas that are littered with garbage and permeated with open sewerage systems, (often complemented with the infamous 'flying toilets') to the very clean areas with high levels of infrastructure and garbage collection systems. We are eagerly anticipating what these radically different, yet often closely neighbouring environments will yield in terms of microbial diversity!



99 Household; Poultry sampling

Another exciting variation is on the human, livestock and wildlife interface; there are sub-locations where livestock keeping is illegal, limiting the human-livestock interaction; whereas free ranging animals like

goats and pigs are common in other areas, scavenging on rubbish, or grazing public spaces such as playing fields and road verges. Yet other sub-locations are endowed with lots of wild animals as they are neighbouring forests, or generally consist of large, well-established plots with many mature trees and well-tended vegetable gardens.

In any of the randomly selected households, the project team collect a variety of sample types, including human stools, environmental samples, and animal-source foods, such as meat, eggs or milk; as well as faeces from birds, rodents, and livestock. *E. coli* can be found in all of these places, but how are the different strains distributed between each of these different ecological niches that are in such close physical proximity? How much sharing of genetic material goes on between these bacterial communities, especially of those genes that give us cause for concern; ones that confer antibiotic resistance or ability to cause serious disease. In every sub-location, we sample one non-livestock keeping household and two



99 Household; Low income area in Nairobi

households keeping livestock of diverse types. How these different combinations of people and animals in a similar urban environment influence the diversity of pathogens within a household- is another fascinating aspect of bacterial ecology that we hope this project will uncover.

The crowded and dusty streets in the low income areas in Nairobi are always full of food vendors selling both raw and cooked foodstuffs, unlike the high-income areas where majority of the residents buy food from supermarkets

and high class butcheries. A difference in the food safety risk is anticipated between different types of suppliers of animal source foods, but the degree of this variation and the pathogens involved is something that remains largely unexplored. The 99

Households component of the Urban Zoo project is contributing to this, by starting to map *E.coli* and *Campylobacter* at the level of the consumer. We are beginning the next stage; to survey and collect samples along the length of the value chains that deliver meat to the tables of Nairobi citizens. Maud Carron, a PhD student, has this week begun sampling the chicken meat value chains in two contrasting areas of Nairobi, focusing mainly on *Campylobacter*; one of the leading causes of food-borne diarrhoeal illness in countries with a modern, intensive chicken production system. In the next few months, sampling will be expanded to the ruminant and pig meat value chains – watch this space for news of the next exciting phase of Urban Zoo!



99 Household: High income area in Nairobi

The 99 Households Study is part of the [Urban Zoo Project](#) which is a joint project between scientists from Kenya and the UK. We are interested in how diseases can be transmitted between animals and people living in close contact in a city environment.

The [99 Household study](#) aims to collect in-depth information from 99 families from 33 different neighbourhoods stratified by socio-economic status across the whole of Nairobi. We are testing humans, animals and the home environment for bacteria that can be shared and spread between them.



study. The residents have contributed significantly to investigation of major outbreaks in the country including polio, measles, aflatoxicosis, Ebola preparedness and screening at the port of entry. They have also participated in disease outbreak investigations across Africa, for instance Rift Valley Fever outbreak in Swaziland, Cholera outbreak in Zimbabwe and Cameroon, and Ebola and Marburg outbreaks in Uganda, Sierra Leone, Liberia and Guinea.

FELTP started a partnership with the [ZED Group](#) in ILRI where some of the FELTP residents at advance level training are attached at ZED group/ILRI for their field placement. Currently there are six residents attached at the ZED Group/ILRI. The residents come from cohort 11 and cohort 12 include two medical officers and four veterinarians.

Authored by **Mark Obonyo**

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- **Suspected rabies in humans and animals, Laikipia County, Kenya**[letter]; Obonyo M.O., Akoko J.M., Orinde A.B., Osoro E., Boru W.G., Njeru I., and Fèvre E.M (2016): Emerg Infect Dis. 2016 Mar. [8th Feb. 2016]. doi:10.3201/eid2203.151118
- **Prevalence of Taenia solium cysticercosis in pigs entering the food chain in western Kenya**; Thomas, L.F., Harrison, L.J., Toye, P., de Glanville, W.A., Cook, E.A., Wamae, C. N., & Fèvre, E.M. (2016): Trop Anim Health Prod. 48(1), 233-238. doi:10.1007/s11250-015-0949-6

- ILRI-DAAD PhD Scholarship: **Animal Biosciences– One Health approach to vector biology and arbovirus epidemiology in smallholder livestock systems:** <http://www.zoonotic-diseases.org/opportunities/>
- ILRI-DAAD PhD Scholarship: **Cystic Echinococcosis-Distribution and genetic diversity:** <http://www.zoonotic-diseases.org/opportunities/>



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www.zoonotic-diseases.org

- Annual Meeting of the Society for Veterinary Epidemiology and Preventive Medicine (SVEPM) to be held 16-18 March 2016 in Elsinore, Denmark. <http://svepm2016.org/>
- One Health for the Real World: zoonoses, ecosystems and wellbeing symposium scheduled for 17 Mar - 18 Mar 2016. Registration through: www.zsl.org/science/whats-on/one-health-for-the-real-world-zoonoses-ecosystems-and-wellbeing
- 19th Annual Conference on Vaccine Research to held at Baltimore, MD as from April 18-20, 2016: <http://www.cvent.com/events/19th-annual-conference-on-vaccine-research/event-summary-9c2a6b5301a64921afbd9c07a4cffa14.aspx?refid=spcoc>
- The Kenya Medical Association (KMA) 44th Annual Scientific Conference and AGM to be held on 20th to 23rd April 2016 at the Acacia Premier Hotel in Kisumu, Kenya: http://www.kma.co.ke/kmaconference/current_events/KASCA44/
- 2nd International Conference on One Medicine One Science to held at University of Minnesota, Minneapolis, USA as from April 24–27, 2016: <http://cceeevents.umn.edu/icomos>
- Kenya Veterinary Association (KVA) 50th Annual scientific conference and 16th World Veterinary Day Celebrations 2016 to be held as from 27th to 30th April, 2016 at Three Steers (Nairobi Pacific) Hotel, Meru County: <http://www.kva.co.ke/index.php/conference-overview.html>
- 2nd Annual International Conference on Public Health to held at Athens, Greece as from -5 May 2016: <http://www.atiner.gr/publichealth>
- 25th International ICFMH Conference - FoodMicro 2016 to held at the University College Dublin, Ireland as from 19th – 22nd July, 2016: <http://www.foodmicro2016.com/>
- The International Society for Neglected Tropical Diseases Bites to be held at Lords Cricket Ground, London as from March 17th 2016: <http://www.isntdbites.com/>