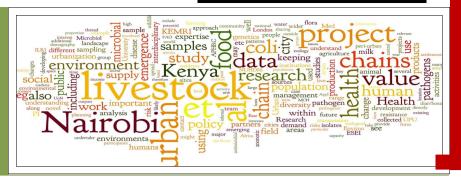
## The "URBAN ZOO" Newsletter



### FEBRUARY, 2016

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

Letter from the Pl

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### 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.



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-Pls on this large project do in turn, and as I wrote for the first newsletter, this must make this issue the 10th so far.

Prof. Eric Fèvre

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-humanlivestock 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 socioeconomic 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:



















## Vrban Zoo Annual Meeting

The multidisciplinary *Epidemiology*, *ecology and socio-economics of disease emergence in Nairobi Project* (Urban Zoo project) held its third annual meeting in London on January 19<sup>th</sup> and 20<sup>th</sup>, 2016. The meeting was attended by representatives from ILRI, APHRC, KEMRI, University of Nairobi, RVC, University of Liverpool, SOAS and the University of Edinburgh, UCL, IIED. Pls, PhD students, post docs and other researchers involved in the project, as well as members of the External Panel, our group of 'friendly critics' who keep the project on track, gathered to discuss this year's progress.

The Urban Zoo project investigates the role of urbanization in the emergence of zoonotic pathogens. It fosters numerous PhD and MSc projects, thus achieving its capacity-building objectives. Jointly, these studies, which cover diversified fields such as peri-urban wildlife, livestock value chains and the



Nairobis

Post meeting group photo

social and spatial components of livestock rearing, will allow for a detailed understanding of Nairobi's human-livestock-wildlife interfaces.

The "99 Households" (99HH) component of the project uses a landscape genetics approach to understanding *E. coli* distribution across Nairobi. Major progress in this component was reported. Not only have the sampling plan and laboratory protocols been finalised since the last meeting, but sampling across Nairobi is well underway. Thirty households have already been sampled in 10 sub-locations before December 2015. As planned, samples from humans, livestock, the environment and wildlife are being

Meeting participants taking a break

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 pipeline for full genome sequencing of the selected 99HH samples has been finalised and tested on a first batch of samples at the University of Edinburgh. A high level of diversity and MLST was noted.

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.

A proposal was made to initiate a demand survey in order to determine animal source foods consumption in

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Authored by Dr. Maud Carron

Nairobi. Ongoing discussions about the scope and feasibility of this study are still ongoing. The Pls 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



Dr. Robert Rono
is a Medical
Doctor working
under the Ministry of Health in
Baringo County.
He is currently

pursuing an MSc in Field Epidemiology at Moi University (FELTP). He is a graduate Fellow at ILRI under the Urban Zoo Project.



Arithi Mutembei is a Veterinarian working under the Director of Veterinary Services in Wajiri County. He is currently undertak-

ing an MSc in Moi University under the Filed Epidemiology and Laboratory Training Program (FELTP). He is a graduate Fellow at ILRI under the Urban Zoo Project.



Henry J. O. Ogutu is a veterinary Officer working under the Ministry Of Livestock in Migori County. He is currently pursuing an

MSc in Moi University under the Field Epidemiology and Laboratory Training Program (FELTP). He is a graduate Fellow at ILRI under the Urban Zoo Project.

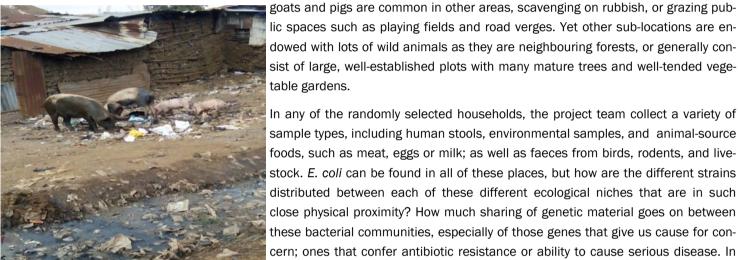


Studying zoonoses of livestock and wildlife in an urban setting presents us with a very interesting study site. We collect samples from the slums (the very low income area), middle income areas and the very high income areas of Nairobi, with varied levels of environmental contamination, ranging from 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



dowed 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

lic spaces such as playing fields and road verges. Yet other sub-locations are en-

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 highincome areas where majority of the residents buy food from supermarkets

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.

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



99 Household: High income area in Nairobi

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!



Authored by James Akoko

### Kenya Field Epidemiology and Laboratory training (FELTP)





Cohort 12 residents participating in a class group activity to assess community knowledge, attitude and practices towards cholera, Machakos County, November 2015

The Kenya program is the first FELTP to be started in Africa in 2004, and its objective is to strengthen in-country public health systems and infrastructure. It is anchored within the Department of Promotive and Preventive Health in the Ministry of Health (MOH) and trains field epidemiologist for the Ministry of Health and Ministry of Agriculture, Livestock and Fisheries (MALF).

It's an experiential based training with 30% classwork and 70% hands on field experience and service provision culminating into a Master of Science Degree in Field Epidemiology from Moi University. The program embraces the One Health approach by bringing together physicians, veterinarians, laboratory scientists. Nurses and environmental health professionals who are trained together and given the skills to effectively address the ever-growing threats of zoonotic diseases, Non communicable Diseases (NCD's) and other emerging and re-emerging infections.

While in training, the residents are attached to various divisions, programs and units within MOH and MALF and other partner organizations in order to achieve the desired competencies/skills which include analysis of data from a surveillance system/evaluation of a surveillance system, scientific communication, and investigations of acute public health events and planned public health epidemiologic

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.

In recognition of the need to increase capacity in epidemiology among all cadres of public health workers, FELTP started 2-3 months training in basic level epidemiology for county medical and veterinary health care workers. The basic epidemiology trainings take place in selected venues on specified dates in various Counties. Since its inception over 300 participants from over 20 counties have been trained.

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

### Recent Publications

- 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

### Current opportunities

- 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/





### **UPCOMING EVENTS:**

- Annual Meeting of the Society for Veterinary Epidemiology and Preventive Medicine (SVEPM) to be held 16-18 March 2016 in Elsinore,
- One Health for the Real World: zoonoses, ecosystems and wellbeing symposium scheduled for 17 Mar 18 Mar 2016. Registration
- 19th Annual Conference on Vaccine Research to held at Baltimore, MD as from April 18-20, 2016: http://www.cvent.com/events/19th-
- 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: 1
- 2nd International Conference on One Medicine One Science to held at University of Minnesota, Minneapolis, USA as from April 24-27, 2016: 1
- 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-
- 2nd Annual International Conference on Public Health to held at Athens, Greece as from -5 May 2016: http://www.atiner.gr/
- 25th International ICFMH Conference FoodMicro 2016 to held at the University College Dublin, Ireland as from 19th 22nd July, 2016:
- The International Society for Neglected Tropical Diseases Bites to be held at Lords Cricket Ground, London as from March 17th 2016:









