Global urbanization
- For the first time in history, more than half the world's population lives in urban areas and over 90% of urbanization is taking place in the developing world.
- The urban population is expected to double from 3.3 billion in 2007 to 6.4 billion in 2050 (Daniel Hoornweg and Paolo Munro-Faure, Urban Agriculture for Sustainable Poverty Alleviation and Food Security, 2008).
- Along with urbanization is the urbanization of poverty and food insecurity.
  - The proportion of the global poor living in cities is expected to increase from 30% in 2000 to 50% by 2035 (H. De Zeeuw).
  - One-third of urban dwellers, about one billion people, live in slums without access to adequate food, water or sanitation.

Urbanization in Africa
- Between 1960 and 2010, Africa's urban population grew from 53 million to 400 million. By 2030, the number of Africans living in towns and cities will increase by a further 345 million. In sub-Saharan Africa, the urban population will double, to almost 600 million.
- Today, about 40% of the African population lives in urban areas. Over next four decades, Africa's urban population is likely to triple in size (World Urbanization Prospects, 2011 Revision, United Nations).
- In many cities of sub-Saharan Africa, slums account for three-quarters of urban residents (Daniel Hoornweg).
- Most urban poor have to rely on the informal sector and unstable occasional work jobs for their survival. In Africa, where food purchases make up 60–80% of total household expenditure, volatile food prices greatly affect the ability of the urban poor to put food on the table.

Growth of urban agriculture
- In cities in developing countries, urban agriculture is part of the fabric of life. An estimated 800 million people globally are engaged in urban agriculture (Daniel Hoornweg).

Urban agriculture in selected African cities
- Ouagadougou, Burkina Faso: 44% of the population engage in urban agriculture.
- Yaoundé, Cameroon: 35% of residents farm.
- Brazzaville, Congo: 33% of households engage in urban agriculture.
- Libreville, Gabon: 80% of families engage in urban agriculture.
- Maputo, Mozambique: 37% of households produce food; 29% raise livestock.
- Accra, Ghana: 50% of families grow food.
- Nairobi, Kenya: 25–30% of households grow food.
- Lusaka, Zambia: 45% of families grow food.

Source:

- Food production in cities contributes 15–20% of the world's food (H. De Zeeuw).
- The commercial peri-urban production of livestock is an extremely fast-growing sector, representing 34% of total meat production and nearly 70% of egg production worldwide (Daniel Hoornweg).
- Urban food producers reduce their expenses, generate income and improve their nutrition and health. Urban agriculture creates jobs and provides fresh food for local consumers.
Zoonoses in Nairobi, Kenya


About the study

With the objective of assessing and minimizing the risks of diseases spread from urban dairies, the project team applied an ‘ecohealth’ approach to its study. Ecohealth research is cross-disciplinary and involves the affected communities in all stages of the research and analysis. It allows the community to describe their problems and develop action plans for improvement. Its aim is to get knowledge to action and research into use.

Our ecohealth approach took into account the wide-ranging impacts of zoonoses on human health, livestock, the environment and the ability of ecosystems to provide health-regulating services such as clean water.

The investigating team included veterinarians, medical practitioners, epidemiologists, parasitologists, economists, sociologists, environmental scientists, gender specialists, policymakers, urban livestock-keepers, non-farming community members, extension officers and public health officials.

The study was led by the University of Nairobi, with key partners from the Kenya Medical Research Institute; Kenya’s Ministry of Livestock Development, Ministry of Agriculture and Ministry of Health; and ILRI. The study was funded by the International Development Research Centre, Canada (IDRC), with support from ILRI.

Methodology

- Surveyed all households in Nairobi’s Dagoretti District to determine the extent of cattle-keeping.
- Surveyed 300 dairy households and 100 non-dairy households to identify factors associated with increased risk of infections.
- Collected and analyzed thousands of cattle and human faecal samples to estimate *Cryptosporidium* prevalence.
- Worked closely with 20 dairy households to understand how the pathogen moves from its cattle hosts to vulnerable people.
- Conducted three surveys (300 dairy households, 140 non-dairy neighbours and 160 people living with HIV/AIDS) and six focus groups to understand how knowledge, attitude and practice influence risk of exposure and to identify social and gender factors that influence exposure.
- Coordinated a team of policymakers, professionals and Dagoretti residents to analyze the research, to develop and disseminate public health messages to reduce the risk of zoonotic disease transmission, and to assess their impacts.

Cattle keeping in Dagoretti District, Nairobi

- Dagoretti, one of eight districts in Nairobi, has a population of 240,509 and unemployment rate of approximately 60%.
- Most people in Dagoretti lack access to piped water, sanitation and electricity. HIV/AIDS, crime and homelessness are persistent problems.
- Based on the ILRI census, 1 in 80 households keep cattle, with an average of 3 cattle per household. Cattle keeping is increasing in prevalence; 20% of the urban livestock keepers began keeping cattle within the last five years.
- Cattle turnover is high at 10% from one season to the next; reproductive performance of the animals was poor.

Focus on cryptosporidiosis, a zoonoses spread from cattle to humans

Many fear that the vast slums of developing country cities provide a crucible for the emergence of novel diseases. The study in Nairobi looked at cryptosporidiosis (commonly called ‘crypto’), a disease first identified in 1976 that has since spread worldwide. It was responsible for the largest recorded water-borne epidemic in 1993 when 400,000 people were infected from the contaminated drinking water supply in Milwaukee, Wisconsin.

‘The fear of diseases spread from cattle, like cryptosporidiosis, has at times led to unwarranted confiscations of cattle kept by city farmers. Our lab-confirmed research shows that fear of this disease appears out of proportion to its actual risks. Policies regulating urban farming need to be based on science and developed with consideration for the diverse needs of communities for health, income and food security.’

—Erastus Kang’ethe, University of Nairobi
Cryptosporidiosis (crypto) is an emerging diarrhoeal disease of people and animals caused by a single-celled parasite Cryptosporidium. The majority of human diarrhoea cases are associated with zoonotic pathogens and/or food sourced from animals. Worldwide, diarrhoea is the second biggest killer of children under five years of age, causing 1.3 million deaths a year. Cryptosporidium lives in the intestine of infected humans or animals. An infected person or animal sheds Cryptosporidium parasites in the stool. People become infected after accidentally swallowing the parasite. Cryptosporidium may be found in or on cattle, in raw milk, in manure, on soil, on vegetables, on food, in water or on other contaminated surfaces. Cryptosporidiosis is found throughout the world, in developed and developing countries. In the United States, an estimated 748,000 cases occur each year. Cryptosporidiosis is especially dangerous for people with HIV/AIDS and malnourished children. It can also sicken livestock and kill newborn calves. Cryptosporidiosis has previously been found in 18% of Nairobi households.

Findings
Prevalence
- The prevalence of cryptosporidiosis ranged from 0–11% across the different surveyed populations (dairy households, neighbours, people with HIV and cattle).
- There was no difference in prevalence of Cryptosporidium between cattle keeping and non-cattle keeping households.
- There was no overall association between infection in cattle and in people in the same households.
- There was no evidence of a higher risk of crypto in people with HIV, suggesting that animal-keeping may not necessarily increase risk of zoonotic infections in this vulnerable group.
- There was no evidence of zoonotic Cryptosporidium in human populations.
- Around 6% of environmental samples were positive for Cryptosporidium.

High-risk groups
- Five groups, making up one-third of the population, were at highest risk of exposure to cryptosporidiosis and other cattle zoonoses with similar transmission pathways.
- Farmworkers, the elderly (due to more contact with cattle), women (through milking activities, feeding and watering cattle and care of sick household members), children and the immunosuppressed were most at risk.
- Children under five years of age had more than ten times the exposure burden as people with clinical AIDS, probably due to their higher numbers and riskier practices, such as swimming in contaminated water bodies.
- Non-dairy households were more likely to report diarrhoea than their dairy-keeping neighbours.

Riskiest practices
- Eating vegetables is a greater source of risk than handling cattle or drinking milk. This is probably because raw cattle dung/manure is used for fertilizer; Cryptosporidium oocysts in manure lodge in, and are protected by, small pores in vegetable leaves.
- Main risk factors included high level of contact with cattle and cattle faeces in dairy and non-dairy households, poor hygiene of cattle sheds, poor calf management practices (calves are main source of zoonotic oocysts), use of un-composted cattle faeces as fertilizer and use of unsafe and untreated water.

Messages and impacts
- The cross-disciplinary team of professionals, policymakers and Dagoretti residents developed targeted messages for each high-risk group.
  - They identified practices that were both good and uncommon: these have had high potential for being more widely adopted. (Note: The concept that public health interventions could be designed around uncommon, beneficial health behaviours that some community members already practiced is called ‘Positive Deviancy’ and its effectiveness is well demonstrated [Marsh et al., 2004]. An innovation in our study was the involvement of negative deviants, that is, people who had most difficulty with good practices.)
  - They included the perspectives of people who had most difficulty with good practices to help in development of realistic messages.
  - They incorporated social incentives (such as the desire to be seen as a good parent) to help motivate behaviour change.

The team developed a strategy to disseminate the messages through:
  - Community campaigners.
  - The involvement of Provincial Administration, representatives from Ministry of Livestock and Fisheries, and a local NGO.
  - A television episode of the edutainment soap opera Makutano Junction set in a typical Kenyan town. The show has 7 million regular viewers, 53% women and 32% urban.
  - Printed material and community workshops.
Results

- Documented improvements in knowledge, attitude and food safety practices.
- Outcome mapping showed change in behaviour: farmers established or maintained clean and well-drained cattle sheds and took other conscious efforts to reduce possible infection.
- Surveys showed an increase in knowledge of cryptosporidiosis between the dry and wet seasons (from 29% to 43%), confirming previous studies on the seasonal nature of risk.

“That non-dairy households were more likely to report diarrhoeal disease than their dairy neighbours underscores the complex relationship between livestock-keeping and health. It could be that the benefits of improved nutrition outweigh the risks of disease exposure in dairying households. This uncertainty underscores the need for more research.”

—Delia Grace, ILRI

“Different groups have different exposure to diseases. By looking at gender, age, occupation and other social factors, we can target those at highest risk to provide the special protection they need. Several studies have shown women and children can be at higher risk. Our study revealed a neglected group—the hired farm workers, who are mostly male.”

—Violet Kimani, University of Nairobi