KENYA - Epidemiology Ecology and Socio-Economics of disease Emergence in Nairobi- Urban Zoonosis Project

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Overview

Identification

ID NUMBER
APHRC-URBZ-2015-1.0

Version

VERSION DESCRIPTION

PRODUCTION DATE
2013-09-05

NOTES
Version 1.0 (July 2015): Datasets edited and anonymised.

Overview

ABSTRACT
Background: It is often claimed that urbanization makes pathogen emergence more likely, but the underlying mechanisms are poorly understood. What characteristics of urban environments might predispose to an emergence event, and what is the contribution of livestock keeping to this process?

We focused on livestock as sources of these pathogens: emerging diseases are likely to be zoonotic in origin, and livestock pathogens, through the close interactions between livestock, their products and people, are at high of risk crossing the species barrier. We studied Escherichia coli (E. coli), an exemplar of many potential emerging pathogens, which exists in a diversity of hosts, in the environment, on food, in waste.

Objective: The overall objective of the project was to understand the mechanisms leading to the introduction of pathogens into urban populations, and their subsequent spread. More specifically, this study focused on the association between diarrhoea among children under the age of 5 years and E. coli in the faeces, E. coli flora in the immediate environment and in the food chain.

Approach: We conducted a case-control study in two Nairobi informal settlements, namely Korogocho and Viwandani, where the Nairobi Urban Health and Demographic Surveillance Survey (NUHDSS) is run. We selected children reporting diarrhoea within the last 3 days and matched them with similar controls who did not have diarrhoea. For both group, we collected data on socio-demographic characteristics of the household, livestock keeping and contact, residential history and a sample of stools. We also randomly sampled the environment; the usual garbage dumping site of the study participants' households, livestock if any, among others -- and from important sources of food like butcheries, milk shops etc in the vicinity.

Output and significance: Our approach, which builds on state-of-the-art methodologies across a range of disciplines, creates a benchmark for future studies, and is applicable to a wide range of situations where animals, people and the environment interact. The findings inform development of policy on urban livestock keeping by improving knowledge of the public health risks and by putting those risks in a wider socio-economic context, including the risks associated with alternative sources of livestock products.

UNITS OF ANALYSIS
Individuals

Scope

NOTES
The study seeks to explore in a population-based matched case-control study the urban risk factors including contact with livestock/livestock products for diarrheagenic E.coli and diarrhoea among children under 5 years residing in two informal settlements (Korogocho and Viwandani) in Nairobi and who are enrolled in either Maternal Child Health (MCH) study or In-depth Vaccination Project (IVP) both of whom are nested within a continuous Nairobi Urban Health and Demographic Surveillance Survey (NUHDSS). The NUHDSS covers the two informal settlements, and each child born within the NUDHDSS

are recruited into the MCH study at 6 months or below. Diagnosis of E.coli was done using bacterial culture of faecal samples from cases and controls. For each study case, two controls, matched for age, sex and locality, were selected from the MCH/NUDHSS database. Parents or close caregivers of each case and control were interviewed to obtain information on social, economic, demographic, environmental and other possible risk factors for diarrhea caused by pathogenic E.coli. Molecular typing, specifically DNA fingerprinting was used to determine the sources/origin of pathogenic E.coli isolates from children with diarrhea. Samples from livestock, environment, and livestock products served as source material for E.coli isolates from the sick children. The DNA fingerprinting methods was used to assess the genomic similarity or dissimilarity between E.coli isolates from the sick children and those from livestock samples, livestock product samples, and other environmental samples.

KEYWORDS
NUHDSS, KEMRI CMR, MCH, IVP, CCDC

Coverage

GEOGRAPHIC COVERAGE
Nairobi Informal settlement- Korogocho and Viwandani

UNIVERSE
This study was a population-based case-control design based on children in the Maternal and Child Health (MCH) study. Children =5yrs from the MCH sampling frame reporting diarrhoea within the last 3 days (case group) were matched with respect to sex and age with others (control group) who had not had diarrhoea in this period. For every "case", two controls were drawn from the MCH, or from the wider NUHDSS if controls from the MCH were not available.

Producers and Sponsors

PRIMARY INVESTIGATOR(S)

Name	Affiliation
African Population and Health Research Center	APHRC

OTHER PRODUCER(S)

Name	Affiliation	Role
Dr Catherine Kyobutungi	Research Organization	Principal Investigator
Dr Eric Fever	Institute of Infection and Global Health, University of Liverpool	Co - Principal Investigator

FUNDING

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Medical Research Council	MRC	Funder

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Sampling

Sampling Procedure

The study was based on the MCH sampling frame. This sampling included all children born within the NUHDSS between 2006 and 2010, and who had been previously recruited in the MCH study between the ages of 1 to 6 months. Those children had been followed up quarterly since their recruitment. Some of those children were ineligible for this study as they were older than 5, but those who met the age criteria were offered an opportunity to participate.

Questionnaires about the maternal and child health (ERB approval N0 KEMRI/RES/7/3/1/) were administered by fieldworkers to mothers or in case she was absent, to another close caregiver of the child. Diarrhoea which was explained to the respondents as >3 loose stools in 24 hours within the last three days was easily recognized by the mother or the caregiver. A child found to have diarrhoea was offered the opportunity to be included in the study.

Fieldworkers were given a list of children in the MCH study stratified by enumeration area, age and sex. Respondents (children =5yrs) from the MCH sampling frame reporting diarrhoea within the last 3 days were offered the opportunity to participate in the study. Each "case" was matched with respect to sex, age with two controls who had not had diarrhoea in this period. Those two controls were drawn from the same enumeration area and the MCH sample preferably or the wider NUHDSS if no control from the MCH was available. The nearest match was selected and if (s)he declines to participate then the second nearest matching control was selected and so on.

Deviations from Sample Design

None

Weighting

Previous studies indicated that the point prevalence of diarrhoea in child cohorts in Kenya is ~18%-30% , or approximately 8 diarrhoea days per child per year , such that 750 to 1600 children with diarrhoea could be reasonably recruited from the MCH.

Conservatively assuming 20% decrease in the prevalence of diarrhoea and using a formula to get proportion of cases exposed, The number of cases required was 215. Thus as few as 215 "cases" could give us 90% power to detect significant associations at 5% significance level with odds ratios of at least 1.8 odds ratio

Questionnaires

Overview

This study used the WHO definition of diarrhea as "the passage of 3 or more loose or liquid stools per day". Pre-tested structured questionnaires to gather information on household economic data for a wealth ranking exercise, food consumption habits, food sources, livestock keeping (in the city or in rural homes), animal contact, hygiene habits, water sources, water treatment etc. Risk factor data e.g. residential history, food eating habits, livestock or animal contact etc. will be collected. In addition, clinical examination was performed by a clinical officer on the children =5yrs and measurements taken for weight, height, Mid-Upper Arm Circumference, temperature, as well as a recent history of a range of signs and symptoms (e.g. headache, splenomegaly, membrane palour, weight loss, diarrhoea, vomiting, chest pain, tiredness, known disease episodes, etc.).

Data Collection

Data Collection Dates

Start	End	Cycle
2013-09-05	2014-04-25	N/A

Data Collection Mode

Face-to-face [f2f]

Questionnaires

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Supervision

The data collection consisted of four teams of 15 field workers, a supervisor for each team of either gender and a clinical officer for each site. Recruitment was done based on past performance and experiences in surveys, ability to relate to the target group, and ability to speak the survey languages.
The training of data collectors consisted a detailed, question-by-question explanation of the questionnaires/interview guides, demonstration of interviewing techniques through role-plays, group discussions, research ethics, procedures for seeking of informed consent, and field logistics. The supervisors received additional training on management of data collection; team dynamics, survey planning and logistics, observing interviews, and spot checking for data quality.

Data Processing

No content available

Data Appraisal

No content available