

SESSION 2-2

« Transmissible diseases »

Wednesday, September 11th

Room : D 113 à 16h30

Gauthier DOBIGNY

Town : Montferrier-sur-Lez, France

Job Title : CR1

Company : IRD

Title of the presentation : « Rodents and public health in Sahelian cities: first results from a multidisciplinary approach linking community ecology, population genetics and urban landscape ecology in Niamey, Niger »

Abstract :

Rodents are major pest for crops and food stocks, and are central to the epidemiology of numerous human pathogens. In urban environments, commensal rodents are abundant and benefit from important and permanent resources. This situation potentially increases rodent-human interactions and the risk of associated diseases. Such a phenomenon may be greatly enhanced in developing countries due to poor sanitary conditions. Yet, data about rodent dynamics in cities are extremely scarce, especially in Sub-Saharan Africa. We have conducted a study of rodents and rodent-borne pathogens in Niamey, Niger, a city that was created almost ex nihilo nearly 120 years ago. A total of more than 1,000 individuals were trapped and unambiguously identified at the species-level using various genetic methods when necessary. We additionally assessed the spatial genetic structure of a native (*Mastomys natalensis*) an invasive (*Rattus rattus*) species at the spatial scale of the city. We developed a Geographic Information System (GIS) of the Niamey city and surveyed a set of socioeconomic indicators so as to explore the relationships between rodent distribution and urban landscape structure and dynamics. Our results show that (i) the black rat and the house mouse are currently invading Niamey, most probably following the road traffic along some of the main commercial axes, (ii) these invasive rodents progressively replace the native species and display very different genetic structures, (iii) socio-ecological conditions are poor proxies for rodent abundance, with the only exception being micro-habitats within human dwellings, (iv) several human pathogens do circulate through rodent populations, and (v) some elements of the urban landscape intervene in rodent populations history and structure. These results are discussed in terms of rodent control and public health consequences and highlight the interest of developing researches in a spatially explicit context.

H. Blaise NGUENDO YONGSI

Town : YAOUNDE, Cameroon

Job Title : No indicated

Company : UNIVERSITE DE YAOUNDE II

Title of the presentation : « GROUPE/RESEAU DE RECHERCHE ET DE FORMATION EN GEOGRAPHIE DE LA SANTE EN AFRIQUE (GRFGEOSA) »

Abstract :

This study group's main interest is to create a training network in health geography within African universities. We also aim at supporting and encouraging exchange of ideas and information among researchers interested in health geography issues. The study group is setting up an email list for members and organizes Africa-focused special session at the « Dynamiques urbaines et enjeux sanitaires: concepts, méthodes et interventions » conference, in which graduate students are particularly encouraged to participate.

Tomohito Okuda

Town : Tokyo, Japan

Job Title : Master's Student

Company : The University of Tokyo

Title of the presentation : « Malaria, Floods and Planning: Impacts of Uncoordinated Urban Water Management in Dakar, Senegal »

Abstract :

Many attempts have been made to identify the relationships between Africa's urban growth and the prevalence of malaria infection, but only a few have addressed how spatial planning can mitigate or aggravate the malaria risk in rapidly growing cities. This paper attempts to show the link between urbanization, development of urban water infrastructures and exposure to Anopheles in Pikine, the biggest part of the peri-urban area of Dakar, Senegal. Previous studies have shown that how slum clearances in the city center and installation of water-wells in the area have caused the illegal occupation of lands close to mosquito breeding sites in Pikine until the 1980s. Since then, forceful eviction of slums has almost disappeared in Dakar, and most contaminated wells have been closed. Nevertheless, the

malaria risk in the peri-urban area has still remained, or even worsened because of recurrent floods since the late 1980s. The majority of the research on Dakar's flood events has addressed the impact of seasonal flooding. Meanwhile, recent investigations have gradually revealed the impact of long-lasting groundwater flooding on the aggravation of living condition, including the prevalence of malaria infection, although no speculations have been made concerning the responsibility of development interventions in this process. In cooperation with a local NGO, the authors collected and analyzed a wide range of papers, reports, books, satellite images and quantitative data including precipitation records, demographic records and groundwater abstraction records since the 1950s. The study has identified the significant impact of inconsistent interventions in urban water management at the metropolitan scale. Dakar began groundwater withdrawal from the shallow aquifer covering today's peri-urban areas in the 1950s. The intense withdrawal lowered the watertable and made part of former water surface available for settlement (Figure 1). This process was the precondition of land occupation by urban poor until the 1980s, as mentioned in existing studies. Along with this informal urbanization, peri-urban Dakar has fallen behind in wastewater management. Water-wells have been strongly polluted, which has led to progressively reduced pumping volumes since the late 1980s. Furthermore, a long-distance water transport system was installed in 1995, but with no means to evacuate wastewater from the area. Thus, wastewater has continued to infiltrate into the aquifer on the one hand, while on the other hand, withdrawal of contaminated groundwater has decreased. Rising groundwater table has finally caused the recurrent long-lasting inundation, aggravating the exposure to mosquito breeding sites in Pikine. Attention has sometimes been called to the risks of a groundwater table rebound, however, as of yet, no countermeasures have been carried out. In summation of the above discussion, the malaria risk in the peri-urban Dakar since the 1980s has been largely affected by the past development interventions, particularly the regional water management. Whereas the intent of the present study is not to deny the positive impacts of these interventions, it is intended to make the argument that planning of rapidly growing informal urban areas without regional coordination can result in unexpected serious problems.

James Michael Ong

Town : Tokyo, Japan

Job Title : Graduate Student

Company : The University of Tokyo

Title of the presentation : « Investigation on the Effect of Environmental Management and Socio-cultural Practices to Dengue Fever Disease Outbreaks in the Philippines »

Abstract :

Ong, James Michael^{1*}), Kurisu, Kiyo²⁾, Hanaki, Keisuke¹⁾ 1) Department of Urban Engineering, The University of Tokyo 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8656, Japan 2) Research Center for Advanced Science and Technology, The University of Tokyo The study aimed to investigate the potential relationships of environmental management and socio-cultural practices to dengue fever infection cases, a mosquito vector borne disease, in Putatan, Muntinlupa City, Philippines. In this paper, around 40 relevant general and site-specific exposure variables revolving around 5 areas of inquiry (flooding and water stagnation, sanitation and solid waste management, water source and storage, human habitation and behavior, and chemical and biological controls) were identified from literature reviews and reconnaissance surveys to develop a pool of potential factors that could affect the disease cases. A case-control study was set-up in which cases (with experience of disease) was compared to the control group (without experience of disease) through statistical techniques for significance testing. Moreover, the samples were further compared between groups based on relatively high and low income standardized levels. To collect data regarding the exposure variables, the questionnaire was prepared and a social survey was conducted in which the sample groups consisting of 200 household respondents were interviewed personally (cases= 50 counts and control= 150 counts). The selection of cases was based on the suspected patients list from the city health authority, while the controls were selected randomly along the similar nearby communities as the case group. Initial findings of the research show that exposure variables related to (1) solid waste management (storage duration and collection service frequency), and (2) flooding incidences (location, frequency and duration) were observed to exhibit statistical significances with medium effect size between the entire set of cases and controls. More specifically, more frequent flooding both inside and outside the house, longer duration time of flood subsidence, longer duration of storing solid wastes, and less frequent collection service in cases than in controls were the results obtained in this study. Furthermore, based on the income group delineation analysis, differences in terms of (a) for low income group, higher counts of using rainwater harvesting, less frequent usage of preventative measures (i.e. bednets) and higher number of rubber tires (potential larval breeding grounds) in cases than in controls, and (b) for high income group, less frequent cleaning of the backyard in cases than in controls were also found to be evident. On the contrary, other variables that were checked and were confirmed to have no significant difference between case and control groups included usage of water storage vessels, drainage cleaning frequency, presence of biological controls (plants and fishes) and frequency of government fumigation programs. Hence, the study presented evidences of disparities in behavioral choices, environmental management level of services and local conditions. With these observed determinants, this research can be utilized in policy-formation and provision of services for dengue fever disease prevention and control in urban areas. Keywords: dengue, case-control study, solid waste management, flood, income group

Dieudonné Uwizeye

Town : Huye, Rwanda

Job Title : PhD student

Company : No indicated

Title of the presentation : « Analysis of Space Dimensions and Geographical Factors to Determine Diarrhoea Risks Variation in Slums of Huye Town, in Rwanda »

Abstract :

The quality of life in most of the cities of the developing world is compromised by a rapid proliferation of slums and informal human habitats. Houses are built according to family formation, with houses directly abutting their neighbours on all sides from the top to the bottom of the hill. The kind of human habitat leaves no room for sanitary services. Subsequently, dwellers of slums and informal settlements are the most exposed to diseases related to unsanitary environment among them diarrheal diseases. A cross-sectional study was done in Huye town, in southern Rwanda, to analyse the effect of space dimensions and geographical factors to determine diarrhoea risks variation in slums. Data was collected using mixed ethnographic techniques including transect walk, household observations and interviews, focus group discussions and health records analysis. The data analysis was done using mixed methods approach, integrating both spatial and statistical tools. Results suggested that diarrhoea risks vary depending on the status of environment within and around the household, and the risks follow spatial and seasonal patterns. A high diarrheal risk was observed during rainy season (55% versus 23.4% during dry season) and the risks increases as altitude decreases. It was also observed that space dimension of the disease plays a significant role. The data showed that diarrheal episodes increased as one moves away from the main road (odds ratio: 1.67). The community members expressed their perceptions on the disease surveillance and mitigation strategies for diarrhoea risks in mountainous urban informal settlements similar to Huye town. Ultimately, they wished to see diarrheal limitation programmes implemented according to local realities. The study draws on theoretical and policy implications for researchers and policy decision makers. -----

----- Key words:
geographical factors, diarrhoea variation, space dimensions, season ----- Authors:
Dieudonné Uwizeye (i, ii), Cosmas H. Sokoni (i), Caroline W. Kabiru (iii) ----- i) University of Dar es Salaam, Tanzania ii) National University of Rwanda, Rwanda iii) African Population and Health Research Centre, Nairobi-Kenya

Olivier Telle

Town : Dieppe, France

Job Title : Post doctorant

Company : Institut Pasteur

Title of the presentation : « Diffusion de la Dengue à Delhi, (Inde) : Le dialogue entre les chercheurs et les responsables de la santé publique »

Abstract :

La dengue est une maladie essentiellement tropicale et subtropicale dont l'agent étiologique est un virus transmis par l'intermédiaire d'un moustique. La maladie affecterait chaque année entre 70 et 500 millions d'individus dans le monde selon l'OMS et la maîtrise de la maladie est aujourd'hui quasiment nulle. Delhi, centre urbain de 15 millions d'habitants, est affectée par la dengue depuis plus de 20 ans et présente désormais un faciès hyper-endémique, démontrant la difficulté des actions de lutte entreprises sur ce territoire. Il faut bien dire que la diffusion dans l'espace de la maladie demeure difficilement prédictible. Dès lors, face à toutes ces incertitudes, la collaboration étroite entre les chercheurs et les responsables de la santé publique locale peut contribuer à valoriser les savoirs accumulés séparément, à les mettre en commun et à tisser des collaborations à fort potentiel heuristique. Notre programme de recherche dans la capitale indienne (AEDESS, financement ANR) est pluridisciplinaire, il associe des géographes, des virologistes, des généticiens et des entomologistes. L'Institut Pasteur (Paris) et l'UMR IDEES (CNRS-université de Rouen) s'associent avec des partenaires indiens particulièrement attentifs aux résultats de cette étude : le Municipal Corporation of Delhi (MCD) et le National Institute of Malaria Research (NIMR). L'approche que nous mettons en place vise à intégrer directement les partenaires en charge de la maladie dans les études réalisées. Il s'agira tout à la fois de participer à la surveillance et au contrôle des épidémies grâce aux analyses scientifiques mais aussi d'améliorer nos recherches en cours en nous appuyant sur les connaissances vernaculaires et scientifiques des partenaires locaux. Des données épidémiologiques et vectorielles ont d'ores et déjà été rassemblées sur plusieurs années (2008-2012). Un travail de géolocalisation des cas, d'analyse spatiale et de simulations a permis de mettre en valeur le travail de collecte réalisé au jour le jour par plus de 2000 employés de la municipalité et du NIMR. Si le modèle de diffusion du virus est identifié sur plusieurs années, la géographie des quartiers affectés est particulièrement changeante, dépendant à la fois de la situation de la dengue dans les autres états indiens, de la zone d'émergence du virus dans la ville, mais aussi liées aux mobilités collectives, aux déplacements de vecteurs et à une certaine part de hasard. Afin de comprendre la diffusion du virus et les espaces de diffusion de la dengue, des études de terrains associant les partenaires scientifiques et les acteurs de la dengue à Delhi vont être réalisées dans plusieurs quartiers de la ville. L'un des objectifs est de dégager des facteurs de risques biologiques (transmission du virus depuis les cas asymptomatiques vers le moustique) et socio-économiques (mobilité des individus, qualité estimée de

l'environnement, etc.), ainsi que leurs interactions. La Communication, sera effectuée en anglais et associera 1 représentant scientifique français (Institut Pasteur, ancien doctorant de l'Université de Rouen) 1 scientifique du NIMR et 1 représentant du département santé de la municipalité de Delhi. Mots clefs : Diffusion, maladie émergente, intra-urbain, dengue, Inde.