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## Urban Health Bulletin: A Compendium of Resources

March/April 2009 – Compiled by Environmental Health at USAID

### Introduction

This issue includes several interesting articles related to the nutritional status of urban residents and results of operational research on urban vector disease control.

We welcome your comments and suggestions. If you are not already, please send your email address to receive future *Urban Health Bulletins*. If you have questions or comments about urban health issues, please contact:

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### Urban Health Analysis

1 - *Ann Trop Med Parasitol*. 2009 Apr; 103(3):249-61.

#### **Geohelminth infection and re-infection after chemotherapy among slum-dwelling children in Durban, South Africa.**

Appleton CC, Mosala TI, Levin J, Olsen A.

School of Biological and Conservation Sciences, Westville Campus, University of KwaZulu-Natal, Durban 4000, South Africa.

The prevalences and intensities of *Ascaris lumbricoides*, *Trichuris trichiura* and hookworm (probably *Necator americanus*) infection were measured in the young children (aged 2-10 years) living in 10 urban slums in Durban, South Africa. Re-infection was assessed at 4-6 and 12 months post-treatment.

The baseline prevalences of *A. lumbricoides* and *T. trichiura* were 81.7%-96.3% and 54.5%-86.2%, respectively, and the corresponding geometric mean intensities were 960 and 91 eggs/g faeces. Most (85%) of the children found infected with *A. lumbricoides* and 23% of those found infected with *T. trichiura* had moderate-heavy infections. A few of the children investigated had intensities of *Ascaris* and *Trichuris* infection that were considerably higher than those previously recorded in South Africa. The baseline prevalences of hookworm infection (0%-20% in individual slums, with a mean of 4.7%) and intensities of such infection (geometric mean=17 eggs/g) were relatively low.

Albendazole proved very effective against *A. lumbricoides* and hookworm but less so against *T. trichiura*. Re-infection by *A. lumbricoides* and *T. trichiura* reached pre-treatment prevalences by 4-6 months post-treatment in some of the slums and by 12 months in all the other slums. By 12 months post-treatment, the intensities of *A. lumbricoides* infection had reached their pre-treatment levels while those of *T. trichiura* infection were higher than at baseline.

Approximately 50% of children had moderate-heavy *T. trichiura* infections at 12 months post-treatment compared with approximately 23% at baseline. Hookworm infections did not re-appear after treatment. The results show clearly that urban slums should be included in any future helminth-control programmes in South Africa.

2 - *BMC Health Serv Res.* 2009 Mar 12; 9:46.

**The state of emergency obstetric care services in Nairobi informal settlements and environs: results from a maternity health facility survey.**

Ziraba AK, Mills S, Madise N, Saliku T, Fotso JC.

African Population and Health Research Center, PO Box 10787, 00100, Nairobi Kenya. [akziraba@yahoo.com](mailto:akziraba@yahoo.com)

**BACKGROUND:** Maternal mortality in Sub-Saharan Africa remains a challenge with estimates exceeding 1,000 maternal deaths per 100,000 live births in some countries. Successful prevention of maternal deaths hinges on adequate and quality emergency obstetric care. In addition to skilled personnel, there is need for a supportive environment in terms of essential drugs and supplies, equipment, and a referral system. Many household surveys report a reasonably high proportion of women delivering in health facilities. However, the quality and adequacy of facilities and personnel are often not assessed. The three delay model; 1) delay in making the decision to seek care; 2) delay in reaching an appropriate obstetric facility; and 3) delay in receiving appropriate care once at the facility guided this project. This paper examines aspects of the third delay by assessing quality of emergency obstetric care in terms of staffing, skills equipment and supplies.

**METHODS:** We used data from a survey of 25 maternity health facilities within or near two slums in Nairobi that were mentioned by women in a household survey as places that they delivered. Ethical clearance was obtained from the Kenya Medical Research Institute. Permission was also sought from the Ministry of Health and the Medical Officer of Health. Data collection included interviews with the staff in-charge of maternity wards using structured questionnaires. We collected information on staffing levels, obstetric procedures performed, availability of equipment and supplies, referral system and health management information system.

**RESULTS:** Out of the 25 health facilities, only two met the criteria for comprehensive emergency obstetric care (both located outside the two slums) while the others provided less than basic emergency obstetric care. Lack of obstetric skills, equipment, and supplies hamper many facilities from providing lifesaving emergency obstetric procedures. Accurate estimation of burden of morbidity and mortality was a challenge due to poor and incomplete medical records.

**CONCLUSION:** The quality of emergency obstetric care services in Nairobi slums is poor and needs improvement. Specific areas that require attention include supervision, regulation of maternity facilities; and ensuring that basic equipment, supplies, and trained personnel are available in order to handle obstetric complications in both public and private facilities.

3 - *Indian J Pediatr.* 2009 Apr 23.

**Client satisfaction with immunization services in urban slums of Lucknow district.**

Nath B, Singh JV, Awasthi S, Bhushan V, Singh SK, Kumar V.

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**OBJECTIVE:** To assess the satisfaction of parents with the immunization services and its association with their sociodemographic characteristics.

**METHODS:** The study was a part of the coverage evaluation survey conducted using the WHO 30 cluster sampling methodology in the Urban slums of Lucknow district, north India. Analysis for a total of 388 respondents of completely or partially immunized children, was done to assess the level of satisfaction and its determinants.

**RESULTS:** The overall satisfaction was more than 90% in the respondents of both the categories of the children, however the difference between the satisfaction rates was found to be significant. Also the satisfaction with accessibility ( $p < 0.04$ ) and information given by the health worker ( $p < 0.00$ ) differed significantly between completely and partially immunized. Most of the sociodemographic factors were not found to have a significant association with the satisfaction related to different parameters of the immunization services.

**CONCLUSION:** The dissatisfaction regarding the various aspects of immunization services emphasizes the imperative need to take urgent intervention, for the achievement of goal of universal immunization.

4 - *Indian J Pediatr.* 2009 Apr 23.

**Nutritional status of adolescent girls from an urban slum area in South India.**

Prashant K, Shaw C.

Department of Pediatrics, Kamineni Institute of Medical Sciences, Narketpally, Andhra Pradesh, India.

**OBJECTIVE:** To assess the nutritional status of adolescent girls in a slum community of Urban Health Center, Panangal.

**METHODS:** A community-based cross-sectional study was carried out over a period of two months. 223 adolescent girls of age 10-18 years were selected randomly. Data was collected by interviewing the adolescent girls using predesigned, pre tested, semi-structured schedule. Parents interview was taken whenever necessary. Anthropometric measurements were recorded using standardized methodology as recommended by World Health Organization (WHO). Standard operational definitions were used. Various statistical applications like percentiles, mean, standard deviation and proportions were used for analysis of the data.

**RESULTS:** Overall prevalence of stunting was found to be 47% and 28.3% as per NCHS and Indian standards respectively. Prevalence of underweight was 42.6% and 22.9% as

per NCHS and Indian standards respectively. Prevalence of thinness was 20.6% as per Indian standards.

**CONCLUSION:** It is concluded that there is a high prevalence of under nutrition among adolescent girls in this slum community. Health education and nutrition interventions are needed on priority basis.

*5 - Reprod Health. 2009 Apr 22;6(1):6.*

### **Maternal mortality in the informal settlements of Nairobi city: what do we know?**

Ziraba AK, Madise N, Mills S, Kyobutungi C, Ezeh A.

**BACKGROUND:** Current estimates of maternal mortality ratios in Kenya are at least as high as 560 deaths per 100,000 live births. Given the pervasive poverty and lack of quality health services in slum areas, the maternal mortality situation in this setting can only be expected to be worse. With a functioning health care system, most maternal deaths are avoidable if complications are identified early. A major challenge to effective monitoring of maternal mortality in developing countries is the lack of reliable data since vital registration systems are either non-existent or under-utilized. In this paper, we estimated the burden and identified causes of maternal mortality in two slums of Nairobi City, Kenya.

**METHODS:** We used data from verbal autopsy interviews conducted on nearly all female deaths aged 15-49 years between January 2003 and December 2005 in two slum communities covered by the Nairobi Urban Health and Demographic Surveillance System (NUHDSS). In describing the distribution of maternal deaths by cause, we examined maternal and late maternal deaths according to the ICD-10 classification. Additionally we used data from a survey of health care facilities that serve residents living in the surveillance areas for 2004-2005 to examine causes of maternal death.

**RESULTS:** The maternal mortality ratio for the two Nairobi slums, for the period January 2003 to December 2005, was 706 maternal deaths per 100,000 live births. The major causes of maternal death were: abortion complications, hemorrhage, sepsis, eclampsia, and ruptured uterus. Only 21% of the 29 maternal deaths delivered or aborted with assistance of a health professional. The verbal autopsy tool seems to capture more abortion related deaths compared to health care facility records. Additionally, there were 22 late maternal deaths (maternal deaths between 42 days and one year of pregnancy termination) most of which were due to HIV/AIDS and anemia.

**CONCLUSIONS:** Maternal mortality ratio is high in the slum population of Nairobi City. The Demographic Surveillance System and verbal autopsy tool may provide the much needed data on maternal mortality and its causes in developing countries. There is urgent need to address the burden of unwanted pregnancies and unsafe abortions among the urban poor. There is also need to strengthen access to HIV services alongside maternal health services since HIV/AIDS is becoming a major indirect cause of maternal deaths.

6 - *Stud Fam Plann.* 2009 Mar; 40(1):39-50.

### **Women's use of private and government health facilities for childbirth in Nairobi's informal settlements.**

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The private sector's role in increasing the use of maternal health care for the poor in developing countries has received increasing attention, yet few data exist for urban slums. Using household-survey data from 1,926 mothers in two informal settlements in Nairobi, Kenya, collected in 2006, we describe and examine the factors associated with women's use of private and government health facilities for childbirth. More women gave birth at private facilities located in the settlements than at government facilities, and one-third of the women gave birth at home or with the assistance of a traditional birth attendant. In multivariate models, women's education, ethnic group, and household wealth were associated with institutional deliveries, especially in government hospitals. Residents in the more disadvantaged settlement were more likely than those in the better-off settlement to give birth in private facilities. In urban areas, maternal health services in both the government and private sectors should be strengthened, and efforts made to reach out to women who give birth at home.

7- *BMC Health Serv Res.* 2009 Apr 2; 9(1):61.

### **Care-seeking behavior and out-of-pocket expenditure for sick newborns among urban poor in Lucknow, northern India: a prospective follow-up study.**

Srivastava NM, Awasthi S, Agarwal GG.

**BACKGROUND:** The state of Uttar Pradesh, India accounts for one-quarter of India's neonatal deaths and 8 percent of those worldwide. More than half (52%) of these deaths occur due to infections. In order to achieve Millenium Development Goal-4 of reducing child mortality by two-thirds by the year 2015, it is important to study factors which affect neonatal health. In Uttar Pradesh there is meager data for spending on health care in general and neonates in particular.

**METHODS:** The study was conducted at an urban Reproductive and Child Health (RCH) center and a District hospital. Neonates were enrolled within 48 hours of birth and were followed-up once between 4 to 8 weeks at the OPD of the respective hospitals or at home. This study assessed (1) distribution of neonatal illnesses and different health providers sought (2) distribution of out-of-pocket expenditures by type of illness and type of health provider sought (3) socio-economic distribution of neonatal illnesses, care-seeking behavior and out-of-pocket expenditures. Per-protocol analysis was performed.

**RESULTS:** Five hundred and ten neonates were enrolled and 481 (94.4%) were followed-up. Parents of 50.3% (242/481) neonates reported at least one symptom of illness. Of these 22.3% (107/481) neonates had illnesses with at least one reported Integrated Management of Neonatal and Childhood Illnesses (IMNCI) danger sign. Among IMNCI illnesses, point prevalence of septicemia was 6.2% and pneumonia was 5.2% while among non-IMNCI illnesses point prevalence of upper respiratory infection was 9.5%, and diarrhea was 7%. Community based non-government dispensers (NGDs) were leading health providers (37.6%). Mean monthly income of families was 2804 Indian

Rupees (INR) (range: 800 to 14000; n=510), where US\$ 1 = 42 INR. Mean out-of-pocket expenditure on neonatal illness was 547.5 INR (range: 1 to 15000; n=202) and mean out-of-pocket expenditure for hospitalization was 4993 INR (range: 41 to 15000; n=17). All hospitalizations were for IMNCI illnesses. Neonates from lower income strata were less likely to receive any medical care ( $p < 0.0001$ ) and were also less likely to be seen by a Government provider ( $p = 0.03$ ).

**CONCLUSION:** Since more than half of the neonates have morbidity and out-of-pocket expenditure on neonatal illnesses often exceeds the family income of the lower strata of the low income group in the community, there is a need to either introduce health insurance scheme or subsidize health care for them. Also, since NGDs, half of which could be unqualified are leading health providers, qualified medical care-seeking for sick newborns should be promoted in urban Lucknow.

*8 - Clin Infect Dis. 2009 Mar 1; 48 Suppl 2:S114-22.*

### **Hospital-based surveillance of invasive pneumococcal disease among young children in urban Nepal.**

Williams EJ, Thorson S, Maskey M, Mahat S, Hamaluba M, Dongol S, Werno AM, Yadav BK, Shah AS, Kelly DF, Adhikari N, Pollard AJ, Murdoch DR.

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**BACKGROUND:** *Streptococcus pneumoniae* is a leading cause of pneumonia and meningitis in young children. Before implementation of the pneumococcal conjugate vaccine in developing countries, there is an urgent need to provide regional epidemiological data on pneumococcal disease. The aims of this study were to determine the prevalence and serotype distribution of invasive pneumococcal disease among young children hospitalized in urban Nepal.

**METHODS:** Children aged 2 months to 5 years who were admitted to Patan Hospital, Kathmandu, with fever and/or suspected pneumonia, meningitis, or bacteremia were recruited. Blood culture specimens were collected from all participants. In cases of suspected meningitis, cerebrospinal fluid specimens were cultured and were tested for *S. pneumoniae* antigen.

**RESULTS:** A total of 885 children were recruited during the 21-month study period. Of these, 76 (9%) had meningitis and 498 (56%) had pneumonia, on the basis of clinical criteria. Radiographically confirmed pneumonia occurred in 354 (40%), and probable or definite meningitis occurred in 47 (5%). *S. pneumoniae* was isolated in specimens from 17 (2%) of the children. Serotypes 1 and 12A were isolated most frequently, and only 1 of 17 isolates had a serotype contained in the currently available 7-valent pneumococcal conjugate vaccine.

**CONCLUSIONS:** More than 60% of children aged <5 years who were admitted with fever and/or suspected invasive bacterial disease in urban Nepal had the clinical syndromes of meningitis and/or pneumonia. A new generation of pneumococcal vaccines that prevent infection with a broader range of serotypes may be necessary to most effectively control pneumococcal disease in young children in Kathmandu.

9 - *Ann Hum Biol.* 2009 Mar-Apr; 36(2): 146-61.

**Determinants of overweight associated with stunting in preschool children of Yaounde, Cameroon.**

Said-Mohamed R, Alliot X, Sobgui M, Pasquet P. CNRS/MNHN, Paris, France.

BACKGROUND: Nutrition transition in developing countries has been associated with higher prevalence of overweight. AIM: The study aimed to identify the factors associated with concurrent stunting and overweight in urban preschool children of Yaounde, Cameroon.

SUBJECTS AND METHODS: 169 preschool children of both sexes were recruited according to their nutritional status: Stunted, overweight, stunted-overweight, and non-stunted-non-overweight. Factors associated with concurrent stunting and overweight were investigated through interviewer-administered questionnaires. A binary logistic regression model was used to determine the relation between nutritional statuses and associated factors.

RESULTS: A low-income family and a low maternal educational level are independent risk factors for a child to be stunted-overweight [odds ratios (95% CI): 3.81 (13.32-1.08), 2.90 (7.82-1.07), respectively]. Mother under-evaluation of child's weight is a factor associated with stunting-overweight and overweight in children [odds ratios (95% CI): 3.42 (8.72-1.33), 6.52 (18.09-2.34), respectively]. Being overweight is also related to higher birth weight. Unlike stunted children, stunted-overweight children live with both their parents and have an older mother. Short maternal stature and mother's over-evaluation of her child's height are independent factors associated with stunting.

CONCLUSION: Poor preschool children of Yaounde are facing concomitant stunting and overweight. More studies are needed to better assess the impact of maternal factors.

10 - *Nutr Res.* 2009 Mar; 29(3):180-9.

**Abdominal obesity explains the positive rural-urban gradient in the prevalence of the metabolic syndrome in Benin, West Africa.**

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This cross-sectional study was designed to verify the hypothesis that there is a positive rural-urban gradient in the overall prevalence of the metabolic syndrome (MetS) and its components and that the differences are associated with socioeconomic status, a sedentary lifestyle, and poor diet quality. A sample of 541 Beninese adults apparently healthy was randomly selected from rural (n = 170), semi-urban (n = 171), and urban (n = 200) areas. The MetS was defined according to the International Diabetes Federation. Diet and physical activity were assessed with a 3-day recall. Socioeconomic and additional lifestyle information was obtained during personal interviews. A positive rural-urban gradient (rural to semi-urban to urban) was observed for the overall prevalence of the MetS (4.1%, 6.4%, and 11%, respectively; P = .035), which reflected that of abdominal obesity (28.2%, 41.5%, 52.5%; P < .001) but not for the other prominent features of the MetS, that is, high blood pressure (HBP; 24.1%, 21.6%, and 26.5%; P > .05) and

reduced high-density lipoprotein cholesterol (HDL-C; 25.3%, 18.1%, 37.5%;  $P < .001$ ). Diet quality and physical activity were higher in rural and semi-urban compared to urban subjects. Physical activity appeared protective for obesity, HBP, and low HDL-C. Micronutrient adequacy was an independent predictor of HDL-C and was associated with a lower likelihood of HBP. Socioeconomic status was positively associated with abdominal obesity only, which was more widespread in women than in men. This study shows that the nutrition transition is ongoing in Benin and suggests that cardiovascular disease risk could be reduced substantially by promoting physical activity and a more adequate diet.

## Urban Environmental Health

11 - *BMC Public Health*. 2009 Apr 27;9(1):115.

### **A typhoid fever outbreak in a slum of South Dumdum municipality, West Bengal, India, 2007: Evidence for foodborne and waterborne transmission.**

Bhunia R, Hutin Y, Ramakrishnan R, Pal N, Sen T, Murhekar M.

**BACKGROUND:** In April 2007, a slum of South Dumdum municipality, West Bengal reported an increase in fever cases. We investigated to identify the agent, the source and to propose recommendations.

**METHODS:** We defined a suspected case of typhoid fever as occurrence of fever for > one week among residents of ward 1 of South Dumdum during February - May 2007. We searched for suspected cases in health care facilities and collected blood specimens. We described the outbreak by time, place and person. We compared probable cases (Widal positive  $\geq 1:80$ ) with neighbourhood-matched controls. We assessed the environment and collected water specimens.

**RESULTS:** We identified 103 suspected cases (Attack rate: 74/10,000, highest among 5-14 years old group, no deaths). *Salmonella* (enteritica) Typhi was isolated from one of four blood specimens and 65 of 103 sera were  $\geq 1:80$  Widal positive. The outbreak started on 13 February, peaked twice during the last week of March and second week of April and lasted till 27 April. Suspected cases clustered around three public taps. Among 65 probable cases and 65 controls, eating milk products from a sweet shop (Matched odds ratio [MOR]: 6.2, 95% confidence interval [CI]: 2.4-16, population attributable fraction [PAF]: 53%) and drinking piped water (MOR: 7.3, 95% CI: 2.5-21, PAF-52%) were associated with illness. The sweet shop food handler suffered from typhoid in January. The pipelines of intermittent non-chlorinated water supply ran next to an open drain connected with sewerage system and water specimens showed faecal contamination.

**CONCLUSIONS:** The investigation suggested that an initial foodborne outbreak of typhoid led to the contamination of the water supply resulting in a secondary, waterborne wave. We educated the food handler, repaired the pipelines and ensured chlorination of the water.

12 - *J Water Health*. 2009 Mar; 7(1):145-54.

**Is fecal contamination of drinking water after collection associated with household water handling and hygiene practices? A study of urban slum households in Hyderabad, India.**

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Water-borne illness, primarily caused by fecal contamination of drinking water, is a major health burden in the state of Andhra Pradesh, India. Currently drinking water is treated at the reservoir level and supplied on alternate days, necessitating storage in households for up to 48 hrs. We hypothesized that fecal contamination occurs principally during storage due to poor water handling. In this study we tested for coliform bacteria in water samples collected at distribution points as household storage containers were filled, and then tested containers in the same households 24-36 hours after collection. We also conducted an observational survey to make an assessment of water handling and hygiene. Ninety-two percent (47/51) of samples tested at supply points were adequately chlorinated and bacterial contamination was found in two samples with no residual chlorine. Samples collected from household storage containers showed an increase in contamination in 18/50 houses (36%). Households with contaminated stored samples did not show significant differences in demographics, water handling, hygiene practices, or sanitation. Nevertheless, the dramatic increase in contamination after collection indicates that until an uninterrupted water supply is possible, the point at which the biggest health impact can be made is at the household level.

## **Urban Vector Disease**

13 - *Vector Borne Zoonotic Dis*. 2009 Mar 9.

**Characterization of Sleeping Sickness Transmission Sites in Rural and Periurban Areas of Kinshasa (République Démocratique du Congo).**

Grébaut P, Bena JM, Manzambi EZ, Mansinsa P, Khande V, Ollivier G, Cuny G, Simo G.

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To characterize the potential transmission sites of sleeping sickness in Kinshasa, two entomologic surveys were carried out during the dry and the rainy seasons in rural and periurban areas of Kinshasa in 2005. About 610 pyramidal traps were set up, and 897 *Glossina fuscipes quanzensis* were captured. Environmental and biologic factors were reported, and relationships between these factors were evaluated using logistic regression and multiple correspondence analysis. The biologic factors (the presence of tsetse flies, human blood meals, and teneral flies) were progressively accumulated at each capture site to permit the characterization of the sleeping sickness transmission risk. The dry season was found to be a more favorable period for the disease transmission than the rainy season. Moreover, the landscapes characterized by the presence of argillaceous soils, raised ground cover with forest residues and rivers, were identified as types of environments with greater risk of sleeping sickness transmission. Pig breeding appeared as an important factor increasing the disease transmission. If vector control is

continuously performed along rivers segments at high risk, the transmission of sleeping sickness in rural and periurban areas of Kinshasa will considerably decrease.

14 - *Rev Saude Publica*. 2009 Apr; 43(2): 369-72.

**Anopheles cruzii larvae found in bromelias in an urban area on the Brazilian coast** [Article in Portuguese]

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The occurrence of *Anopheles* (*Kerteszia*) *cruzii* larvae is reported for the first time in bromelias on the ground located in an urban area within the municipality of Ilha Bela, on the northern coast of the State of São Paulo. From March 1998 to July 1999 312 immature forms of *An. cruzii* were captured, being that 8.6% of them were in bromelias in the urban environment, 40.1% in periurban bromelias and 51.3% in the forest. The average number of bromelias containing *An. cruzii* was 4.0% of the total investigated. The positive rate in the periurban and forested environments presented similar values. The presence of *An. cruzii* is probably due to their having been present previously in the forest, together with the frequent presence of these breeding places, food sources and appropriate shelter in the urban area. This set of factors makes it necessary to warn against the possibility of transferring infections from one environment to the other.

15 - *Lancet*. 2009 Apr 9.

**Home management of malaria with artemether-lumefantrine compared with standard care in urban Ugandan children: a randomised controlled trial.**

Staedke SG, Mwebaza N, Kanya MR, Clark TD, Dorsey G, Rosenthal PJ, Whitty CJ.

London School of Hygiene and Tropical Medicine, London, UK.

**BACKGROUND:** Home management of malaria-the presumptive treatment of febrile children with antimalarial drugs-is advocated to ensure prompt effective treatment of the disease. We assessed the effect of home delivery of artemether-lumefantrine on the incidence of antimalarial treatment and on clinical outcomes in children from an urban setting with fairly low malaria transmission.

**METHODS:** In Kampala, Uganda, 437 children aged between 1 and 6 years from 325 households were randomly assigned by a computer-generated sequence to receive home delivery of prepackaged artemether-lumefantrine for presumptive treatment of febrile illnesses (n=225) or current standard of care (n=212). Randomisation was done by household after a pilot period of 1 month. After randomisation, study participants were followed up for an additional 12 months and information on their health and treatment of illnesses was obtained by use of monthly questionnaires and household diaries, which were completed by the participants' carers. The primary outcome was treatment incidence density per person-year. Analysis of the primary outcome was done on the modified intention-to-treat population, which included all participants apart from those excluded before data collection. This trial is registered with ClinicalTrials.gov, number NCT00115921.

**FINDINGS:** Eight participants in the home management group and four in the standard care group were excluded before data collection; therefore, the primary analysis was done

in 217 and 208 participants, respectively. The home management group received nearly twice the number of antimalarial treatments as the standard care group (4.66 per person-year vs 2.53 per person-year; incidence rate ratio [IRR] 1.72, 95% CI 1.43-2.06,  $p < 0.0001$ ), and nearly five times the number given to children with microscopically confirmed malaria in a comparable cohort of children (4.66 per person-year vs 1.03 per person-year, IRR 5.19, 95% CI 4.24-6.35,  $p < 0.0001$ ). Clinical data were available for 189 children in the home management group and 176 in the control group at study end; the main reasons for exclusion were movement out of the study area or loss to follow-up. The proportion of participants with parasitaemia at final assessment in the intervention group was lower than in the control group (four [2%] vs 17 [10%],  $p = 0.006$ ), but there were no other differences in standard malariometric indices, including anaemia. Serious adverse events were captured retrospectively. One child died in each group (home management-severe pneumonia and possible septicaemia; standard care-presumed respiratory failure).

**INTERPRETATION:** Although home management of malaria led to prompt treatment of fever, there was little effect on clinical outcomes. The substantial over-treatment suggests that artemether-lumefantrine provided in the home might not be appropriate for large urban areas or settings with fairly low malaria transmission.

**FUNDING:** Gates Malaria Partnership.

*16 - Malar J. 2009 Apr 8;8(1):57.*

### **Community-based environmental management for malaria control: evidence from a small-scale intervention in Dar es Salaam, Tanzania.**

Castro MC, Tsuruta A, Kanamori S, Kannady K, Mkude S.

**BACKGROUND:** Historically, environmental management has brought important achievements in malaria control and overall improvements of health conditions. Currently, however, implementation is often considered not to be cost-effective. A community-based environmental management for malaria control was conducted in Dar es Salaam between 2005 and 2007. After community sensitization, two drains were cleaned followed by maintenance. This paper assessed the impact of the intervention on community awareness, prevalence of malaria infection, and *Anopheles* larval presence in drains.

**METHODS:** A survey was conducted in neighbourhoods adjacent to cleaned drains; for comparison, neighbourhoods adjacent to two drains treated with larvicides and two drains under no intervention were also surveyed. Data routinely collected by the Urban Malaria Control Programme were also used. Diverse impacts were evaluated through comparison of means, odds ratios (OR), logistic regression, and time trends calculated by moving averages.

**RESULTS:** Individual awareness of health risks and intervention goals were significantly higher among sensitized neighbourhoods. A reduction in the odds of malaria infection during the post-cleaning period in intervention neighbourhoods was observed when compared to the pre-cleaning period (OR=0.12, 95% CI 0.05-0.3,  $p < 0.001$ ). During the post-cleaning period, a higher risk of infection (OR=1.7, 95% CI 1.1-2.4,  $p = 0.0069$ ) was observed in neighbourhoods under no intervention compared to intervention ones. Eighteen months after the initial cleaning, one of the drains was still clean due to continued maintenance efforts (it contained no waste materials and the water was flowing at normal velocity). A three-month moving average of the percentage of water habitats in

that drain containing pupae and/or Anopheles larvae indicated a decline in larval density. In the other drain, lack of proper resources and local commitment limited success.

**CONCLUSIONS:** Although environmental management was historically coordinated by authoritarian/colonial regimes or by industries/corporations, its successful implementation as part of an integrated vector management framework for malaria control under democratic governments can be possible if four conditions are observed: political will and commitment, community sensitization and participation, provision of financial resources for initial cleaning and structural repairs, and inter-sectoral collaboration. Such effort not only is expected to reduce malaria transmission, but has the potential to empower communities, improve health and environmental conditions, and ultimately contribute to poverty alleviation and sustainable development.

*17 - Am J Trop Med Hyg. 2009 Apr; 80(4):547-54.*

**Distance threshold for the effect of urban agriculture on elevated self-reported malaria prevalence in Accra, Ghana.**

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Irrigated urban agriculture (UA), which has helped alleviate poverty and increase food security in rapidly urbanizing sub-Saharan Africa, may inadvertently support malaria vectors. Previous studies have not identified a variable distance effect on malaria prevalence from UA. This study examines the relationships between self-reported malaria information for 3,164 women surveyed in Accra, Ghana, in 2003, and both household characteristics and proximity to sites of UA. Malaria self-reports are associated with age, education, overall health, socioeconomic status, and solid waste disposal method. The odds of self-reported malaria are significantly higher for women living within 1 km of UA compared with all women living near an irrigation source, the association disappearing beyond this critical distance. Malaria prevalence is often elevated in communities within 1 km of UA despite more favorable socio-economic characteristics than communities beyond 1 km. Neighborhoods within 1 km of UA should be reconsidered as a priority for malaria-related care.

*18 - PLoS ONE. 2009;4(3):e5107.*

**Microbial larvicide application by a large-scale, community-based program reduces malaria infection prevalence in urban Dar es Salaam, Tanzania.**

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**BACKGROUND:** Malaria control in Africa is most tractable in urban settlements yet most research has focused on rural settings. Elimination of malaria transmission from urban areas may require larval control strategies that complement adult mosquito control using insecticide-treated nets or houses, particularly where vectors feed outdoors.

**METHODS AND FINDINGS:** Microbial larvicide (*Bacillus thuringiensis* var. *israelensis* (Bti)) was applied weekly through programmatic, non-randomized community-based, but vertically managed, delivery systems in urban Dar es Salaam, Tanzania. Continuous, randomized cluster sampling of malaria infection prevalence and non-random programmatic surveillance of entomological inoculation rate (EIR) respectively constituted the primary and secondary outcomes surveyed within a population of approximately 612,000 residents in 15 fully urban wards covering 55 km<sup>2</sup>. Bti application for one year in 3 of those wards (17 km<sup>2</sup>) with 128,000 residents) reduced crude annual transmission estimates (Relative EIR [95% Confidence Interval] = 0.683 [0.491-0.952], P = 0.024) but program effectiveness peaked between July and September (Relative EIR [CI] = 0.354 [0.193 to 0.650], P = 0.001) when 45% (9/20) of directly observed transmission events occurred. Larviciding reduced malaria infection risk among children < or =5 years of age (OR [CI] = 0.284 [0.101 to 0.801], P = 0.017) and provided protection at least as good as personal use of an insecticide treated net (OR [CI] = 0.764 [0.614-0.951], P = 0.016).

**CONCLUSIONS:** In this context, larviciding reduced malaria prevalence and complemented existing protection provided by insecticide-treated nets. Larviciding may represent a useful option for integrated vector management in Africa, particularly in its rapidly growing urban centres.

## **HIV/AIDS**

*19 - BMC Public Health. 2009 Mar 11; 9:80.*

### **HIV-related risk behaviours and the correlates among rickshaw pullers of Kamrangirchar, Dhaka, Bangladesh: a cross-sectional study using probability sampling.**

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**BACKGROUND:** National HIV serological and behavioural surveillance of Bangladesh repeatedly demonstrated a very high proportion of rickshaw pullers in Dhaka city, having sex with female sex workers (FSWs) and using illicit substances. However, no study has been conducted to identify the correlates of having sex with FSWs among this population. This study aimed to describe behavioural profile of rickshaw pullers in Dhaka city using probability samples and to identify the correlates for having sex with FSWs in order to focus HIV prevention intervention.

**METHODS:** Six hundred rickshaw pullers were randomly selected from rickshaw garages in the Kamrangirchar area, the single largest slum cluster of Dhaka, Bangladesh, during March-April 2008 using the Proportion Probability to Size method. Participants were interviewed, with a response rate of 99.2% (n = 595), using a structured questionnaire and asked about illicit substance use, sexual behaviour and risk perception for HIV and sexually transmitted diseases. Independent predictors of having sex with FSWs were analysed by multivariate analysis. A qualitative study was subsequently conducted with 30 rickshaw pullers to supplement the findings of the initial survey.

**RESULTS:** The proportion of survey respondents who had sex with FSWs and those who used illicit substances in the previous 12 months period were 7.9% and 24.9%,

respectively, much lower than the results achieved in the 2003-04 behavioural surveillance (72.8% and 89.9%, respectively). Multivariate analysis revealed the characteristics of younger age, being never married, living alone with family remaining in other districts and using illicit substances in the previous 12 months were significantly associated with having sex with FSWs.

**CONCLUSION:** HIV-related risk behaviour of our study population of the rickshaw pullers was lower than what has been suggested by the results of behavioural surveillance. While this discrepancy should be addressed in further studies, our study emphasizes the importance of focused HIV prevention programs for rickshaw pullers as high-risk behaviour is displayed at an unacceptable level and concentrated in identifiable sub-populations.